ELECTRICAL WEST

WITH WHICH IS CONSOLIDATED THE JOURNAL OF ELECTRICITY

McGraw-Hill Co. of Calif. APRIL, 1933 Twenty-five Cents per Copy

In This Issue-

The Manufacturers Directory *and* "Where To Buy In The West"

ECHLIN & ECHLIN, INC., San Francisco, Calif.

ECONOMY ELECTRIC DEVICES CO., Chicago, Ill.—L. A. Nott & Co., San Francisco.

EDISON GENERAL ELEC. APPLIANCE CO., INC., Chicago, Ill.—Branch Offices: Seattle, San Francisco, Los Angeles, Salt Lake City.

EDISON STORAGE BATTERY CO., [illegible]

[illegible]

ELECTRIC MACHINERY MFG. CO., Minneapolis, Minn.—Branch Offices: Seattle, San Francisco, Los Angeles.

ELECTRIC POWER EQUIPMENT CORP., Philadelphia, Pa.—Eicher & Bratt, Seattle; C. E. Ingalls, San Francisco; J. Q. Lalor, Denver; The Galigher Co., Salt Lake City.

ELECTRIC PRODUCTS CO., THE, Cleveland, O.—H. M. Thomas Co., Ira G. Perin, San Francisco; L. W. Thompson, Los Angeles.

ELECTRIC SERVICE SUPPLIES CO., Philadelphia, Pa.—H. M. Euler, Portland; F. F. Bodler, Schleicher & Co., San Francisco; A. W. Arlin, Los Angeles; L. V. Wilson, Phoenix; B. A. Franklin, Denver; L. Brandenburger, Salt Lake City.

ELECTRIC SIGNAL CO., LTD., Los Angeles, Calif.—Sierra Equipment Corp., San Francisco, Los Angeles.

ELECTRIC STORAGE BATTERY CO., The, Philadelphia, Pa.—[illegible]

ELECTRIC VACUUM CLEANER CO. INC., Cleveland, O.—Branch Offices: THE PREMIER VACUUM CLEANER CO., Portland, San Francisco, Los Angeles.

ELECTRICAL ENGINEERS EQUIPMENT CO., Melrose Park, Ill.—F. W. Carlson, Seattle; J. M. Cavanaugh, Portland; C. D. LaMoree, San Francisco, Los Angeles; O. H. Davidson, Denver.

ELECTRICAL FACILITIES, INC., Oakland, Calif.—Thomas S. Wood, Seattle; A. F. Blacksmith, Los Angeles.

ELECTROMASTER INC., Detroit, Mich.—Cronin Distributing Co., Portland; Fernand Pincoffs Co., Los Angeles; Western Supply Company, Salt Lake City.

ELECTROTRIM, INC., Union City, Ind.—C. R. Hunt, San Francisco.

ESTATE STOVE CO., THE, Hamilton, O.—Branch Offices: Portland, Los Angeles, Salt Lake City; Leo J. Meyberg Co., San Francisco, Los Angeles; Harper-Meegee Co., Seattle.

ESTERLINE-ANGUS CO., Indianapolis, Ind.—A. H. Cox & Co., Seattle; George L. Hoffman, Portland; C. F. Henderson, San Francisco; Quality Electric Co., Los Angeles; J. E. Redmond Co., Phoenix.

EUREKA VACUUM CLEANER CO., Detroit, Mich.—Branch Offices: Seattle, Spokane, Portland, San Francisco, Los Angeles, Salt Lake City, Denver.

EVERYDAY ELECTRIC CO., Marion, Ind.—Irving P. Bean, Seattle; E. J. A. Gardiner, San Francisco; J. W. Laycock, Los Angeles.

EXCEL MFG. CORP., Muncie, Ind.—Graybar Electric Co., Los Angeles.

FAIRBANKS, MORSE & CO., Chicago, Ill.—Branch Offices: Seattle, San Francisco, Los Angeles.

FELDMAN & CO., INC., J. M., Los Angeles, Calif.—Branch Office: San Francisco.

FIBRE CONDUIT CO., THE, Orangeburg, N. Y.—Johns-Manville Corp., Seattle, Portland, San Francisco, Los Angeles, Salt Lake City.

FIRE PROOF WALL CO., Oakland, Calif.—W. R. Hendrey Co., Seattle; Indus. Engr. & Equip. Corp., Los Angeles.

FLOOROLA CORP., THE, York, Pa.—Commercial Soap & Chem. Co., San Francisco.

FOSTER LUMBER CO., [illegible]

FOUR WHEEL DRIVE SALES CO., Clintonville, Wis.—M. O. Stockland, Jr., Branch Mgr., San Francisco.

FRALICK & CO., S. E., Chicago, Ill.—C. E. Delerick, Portland; J. J. Schaller Co., Los Angeles.

FRENCH BATTERY CO., Madison, Wis.—Snow Sales Co., Spokane; Wallace R. Lynn Co., San Fran[illegible]

[illegible]

FRINK CORP., THE, Long Island City, N. Y.—James Mundstock, Branch Mgr., San Francisco, [illegible] Oakland, Los Angeles; Distributors: Jensen-Byrd Co., Spokane; W. H. Bintz Co., Salt Lake City.

[illegible] man, Los Angeles; W. H. Schwade, Denver; Thad J. Stevens, Salt Lake City; J. E. Redmond Co., Phoenix.

GARLAND ELECTRIC SPECIALTY CO., Chicago, Ill.—W. R. Hendrey, Co., Seattle; C. E. Ingalls, San Francisco; Farnham & Cunningham, Los Angeles; Ambler & Riter, Salt Lake City; Mountain States Machinery Co., Denver.

GARLAND MFG. CO., Pittsburgh, Pa.—J. G. Pomeroy, Co., San Francisco; Los Angeles.

GARY STRUCTURAL STEEL CO., Gary, Ind.—H. B. Squires Co., San Francisco; Utilities Supply Co., Los Angeles.

G. C. A. MFG. CO., THE, Pittsfield, Mass.—H. H. Manny Co., Seattle; Joslyn Co. of Calif., Los Angeles, Jobbers.

GENERAL CABLE CORP., New York City—Branch Offices: Seattle, San Francisco, Los Angeles.

GENERAL ELECTRIC CO. (Mdse. Dept.) Bridgeport, Conn.—Branch Offices all principal cities.

GENERAL ELECTRIC CO., Schenectady, N. Y.—J. A. Cranston, Consulting Vice President, San Francisco, [illegible] principal cities.

GENERAL ELECTRIC VAPOR LAMP CO., Hoboken, N. J.—Keeg Eng'g Co., San Francisco, Hollywood.

GENERAL REFRIGERATION SALES CO., Beloit, Wis.—Gray McLean & Percy, Seattle, Portland; Allied Industries, Inc., San Francisco; C. Sowers, Los Angeles.

GIBSON ELEC. REFRIGERATOR CORP., Greenville, Mich.—L. Taufenbuch, Western Sales Mgr., Los Angeles, Jobbers.

GILBERT CO., A. C., New Haven, Conn.—F. A. Degnan, San Francisco.

GILFILLAN BROS., INC., Los Angeles, Calif.

GILL GLASS & FIXTURE CO., Philadelphia, Pa.—R. E. Baum, San Francisco.

GLOBAR CORP., Niagara Falls, N. Y.—Pacific Abrasive Supply Co., San Francisco, Los Angeles.

GOODRICH [illegible] Chicago, Ill. Rubber Co., Seattle; San Francisco; Los Angeles.

GREEN [illegible] CO., Seattle, Wash.

GUTH, THE EDWIN F. CO., St. Louis, [illegible] Office: San Francisco.

HAAG BROS CO., Peoria, Ill.—Jobbers.

HAGAN [illegible] GEORGE J., Pittsburgh, Pa. [illegible] Co., San Francisco.

HAMILTON BEACH MFG. CO., Racine, Wis.—Leading jobbers.

HANKSCRAFT COMPANY, Madison, Wis.—Erlach-Lee Company, San Francisco.

HART & HEGEMAN DIV., Hartford, Conn.—Garnett Young & Co., Seattle, San Francisco, Los Angeles.

HART MANUFACTURING COMPANY, Hartford, Conn.—Sierra Equipment Corp., Seattle, San Francisco, Los Angeles.

HASKINS CO., R. G., Chicago, Ill.—J. C. Fletcher, San Francisco; H. J. Zonne, Los Angeles.

HEINEMANN ELECTRIC CO., Trenton, N. J.—A. S. Knight Co., Seattle; Henger Seltzer Co., San Francisco, Los Angeles.

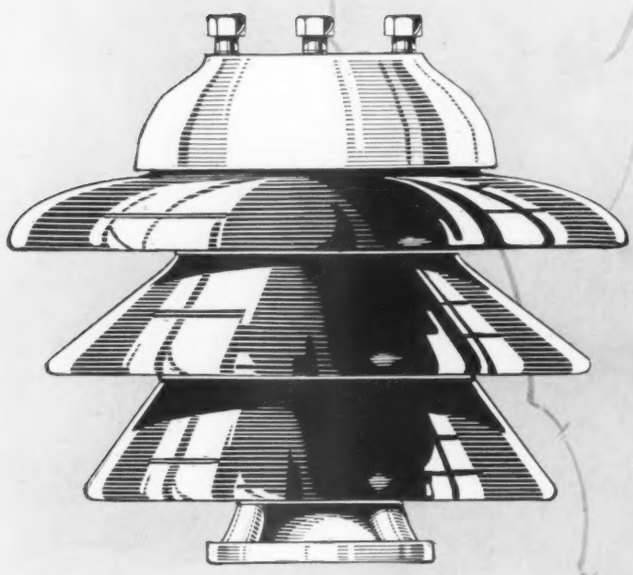
HEMINGRAY GLASS CO., Muncie, Ind.—Leading Jobbers.

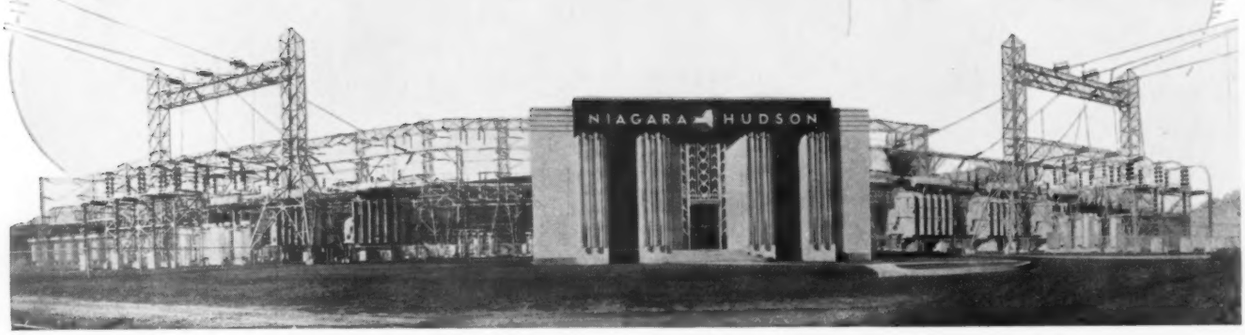
HERWIG COMPANY, THE, Chicago, Ill.—Frazer & Co., Ltd., San Francisco.

HEXACON ELEC. APPLIANCE CORP., Roselle Park, N. J.—C. [illegible]

More than 50% of all the switch type insulators in the country were designed and manufactured by Locke.

LOCKE





300,000 kv-a. substation of the New York Power and Light Corporation at Pleasant Valley.

GENERAL ELECTRIC SUPPLY CORPORATION., PACIFIC COAST DISTRIBUTOR

ELECTRICAL WEST (with which is consolidated The Journal of Electricity). April, 1933, Vol. 70, No. 4. Published monthly by the McGraw-Hill Company of California, 883 Mission St., San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, $2 per year; Canada, $2.50 including duty; all other countries $3 gold (thirteen shillings). Single copy, 25c.

Copyright 1933, McGraw-Hill Company of California.

We mean BUSINESS

. . . and our dealers are going to get it!

SPRING SHOWING

Westinghouse *Dual-automatic Refrigerators*

Here's one of the most concerted drives for refrigerator sales in history. We mean business, and we're *going the limit* to see to it that Westinghouse dealers *get* business.

1933 is going to be a Westinghouse year. Spring Showing is just one of many similar merchandising campaigns planned. These plans, together with the lifetime quality, extra dependability and convenience refinements of the Westinghouse HERMETICALLY-SEALED, Dual-automatic Refrigerator give Westinghouse dealers a golden opportunity. Popular prices and Westinghouse financing arrangements climax the franchise. ONE LINE, *complete* . . . ONE QUALITY, *the best*, convincingly proves that it's an extravagance to pay more, a gamble to pay less.

There's still time to cash in on the extra profit opportunities offered by the Westinghouse franchise this year. *But act quickly.* Write, wire or mail the coupon for detailed information *now!* Westinghouse Electric & Manufacturing Company, Refrigeration Division, Mansfield, Ohio.

1 Complete Spring Showing Selling Plan for every Westinghouse Dealer. Contains detailed information for staging Spring Showing . . . catalog of all material . . . dramatic floor demonstration . . . suggestions for local publicity and special events.

2 Powerful magazine advertising in 7 leading publications will invite everyone to Spring Showing at dealer showrooms.

3 Dominant campaign in newspapers throughout the country will localize magazine advertising and add impetus to Spring Showing.

4 Colorful, arresting posters on billboards everywhere carrying name and address of dealers will again invite prospects to the Spring Showing.

5 Compelling direct mail, handout folders, printed invitations will carry Spring Showing details to the home of every prospect.

6 Special window display and showroom decorations will make every Westinghouse dealer's store Refrigeration Headquarters during Spring Showing.

7 Radio announcements and invitations over an elaborate coast to coast network will broadcast news of the Spring Showing.

GET COMPLETE WESTINGHOUSE FRANCHISE DETAILS TODAY

Westinghouse

Westinghouse Electric & Mfg. Co.,
1 Montgomery St., San Francisco, Calif.

We mean business, too. Please send Westinghouse franchise facts.

Name_____

Address_____

City _____ State_____

MEALS fit for a King cook themselves
.... while the Queen is in the garden
ELECTRIC RANGES give precious freedom
SIMPLIFY LIVING... LESSEN WORK
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY

Now you can always depend upon punctual meals
ELECTRIC RANGES obey orders
...SO SIMPLE ...SO EASY TO OPERATE
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY

DO PROSPECTS KNOW WHO you are — WHERE you are?

To Increase Your Electric Range Sales USE TIE-IN ADVERTISING

The current P. G. and E. advertising, promoting the sale of Electric Ranges, is pitched to the appeal of *Simplified Cooking*. The advertising in copy and illustration tells the story of a Better, Simpler, Easier, and Carefree method of cooking made possible by the modern Electric Range. The lowered prices of this year's improved Electric Ranges are emphasized along with liberal purchase terms.

The entire advertising campaign (March, April, May) is designed primarily to build public DESIRE for Electric Ranges. The campaign does not specifically *sell* Electric Ranges. The job of *selling* the prospects created by this advertising, purposely is left open to local range dealers. Prospects are, however, invited to dealers' stores.

As the advertising messages are appearing regularly in the homes of more than a half million P. G. and E. customers, aggressive dealers find it profitable to direct prospects to their stores through tie-in advertising. They are publishing their own advertising beside each P. G. and E. newspaper advertisement. Such tie-in advertising gives the prospective buyer what he needs and wants to know—WHO is the local dealer who sells Electric Ranges, and WHERE is his store.

Build up a profitable percentage of Electric Range sales during this greater Spring campaign. Consult your local newspaper publisher about tie-in advertising. It's the most effective method of telling the greatest number of prospects that YOU are one of the dealers our advertising invited them to see.

P · G · and E ·

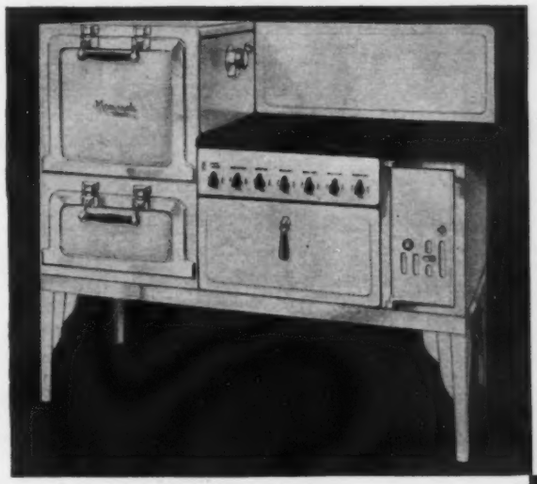
EW-104-432

PACIFIC GAS AND ELECTRIC COMPANY

OWNED . OPERATED . MANAGED BY CALIFORNIANS

As Ever....

MONARCH *leads with the* NEW ... *the* BEAUTIFUL ... *and the* PRACTICAL



In these strenuous days of 1932, it takes novel design, and outstanding quality at competitively low prices to produce good business. That is what we are giving Monarch dealers in this new line.

Styles shown here are but a sample of the wide variety of types and sizes suitable for every home and every purse.

Our catalog, prices and merchandising plan will be sent on request to any established merchant ambitious to enter the electric range business on a sound basis.

Monarch

MONARCH 1932 models introduce a *new* top finish — acid-resisting porcelain enamel in a rich dark green marbleized pattern.

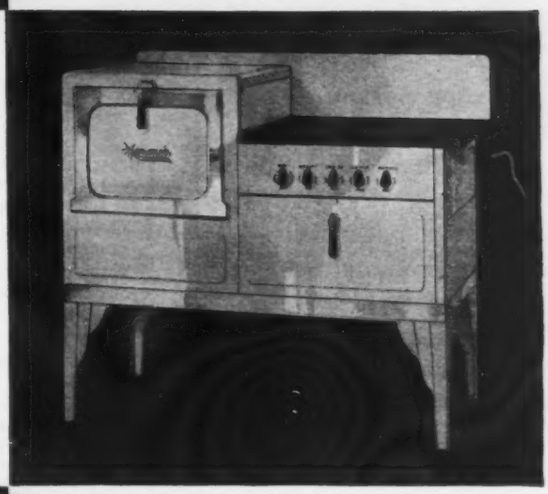
All metal parts have our exclusive Mircobrite finish, an enduring chromium surfacing, ideal for stove use.

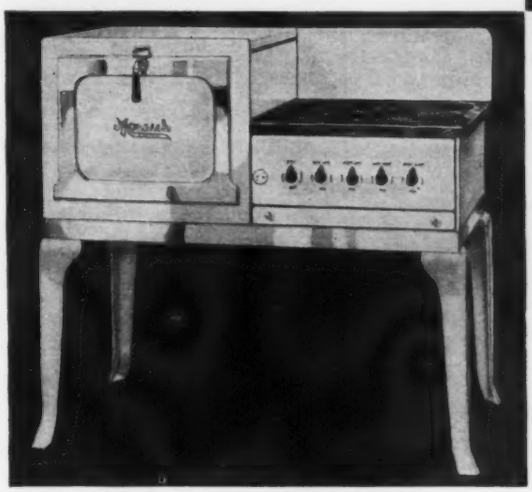
Porcelain enamels of white, Ivory-Tan or Nile-Green enhance the graceful designs of modern tendency.

Built-in kitchen heater for coal and wood is available with several models to meet the demand in certain territories.

Automatic electric timer-clock controls, that never need winding—optional.

Monarch





Above left—Model H26F, with large bake oven and small unit for pastry-baking or broiling; aluminum lined. Also standard coal-wood firebox built-in. Standard heat control. Full enamel in choice of colors.

Above—Model 17F, a low priced range with 17-inch oven, vitreous enamel lined with automatic temperature control. Full enamel in choice of white or two standard tints.

Left—Model 47F, a medium priced range with 17-inch aluminum lined oven and heat control. Also available in white or standard tints.

Monarch

MALLEABLE IRON RANGE CO.
3114 LAKE STREET
BEAVER DAM, WIS.

Branches in Coast Cities

Central Station Representatives:.....Clyde L. Chamblin Co., 639 Mission Street, San Francisco, California
Dealer Representative:.....Glenn L. Brown, 3515 Kempton Place, Oakland, California
Northwest Representative:.....G. A. Lieser, 1218 17th Avenue North, Seattle, Washington

TWO NEW ELECTRIC RANGES

by Hotpoint

Styled and priced for the new era

HOTPOINT'S two beautiful new range models complete a line of modern, advanced electric ranges styled and priced for 1933 selling. Every detail is in keeping with the modern trend. Smart new light ivory color blends readily with any color scheme. Speed that is really amazing. New popular prices to suit every purse. Economy of operation that keeps customers sold.

The Chicagoan, new standard bearer of the Hotpoint line, is a striking new table top model. Hotpoint's patented extension type oven shelves slide in and out easily, like a drawer. No stooping, no bending to look into the oven. Now the low oven is a practical convenience.

The Chicagoan is designed for built-in kitchens. Flat back fits snugly against wall. Rear legs are movable to allow for baseboard. Flush top and sides line up with cabinet or table. Other new and distinctive features in the Chicagoan make it a selling ace at this time. Among these sales advantages are stainless enamel top, smokeless broiler pan, automatic appliance outlet, over-size oven, heavily insulated with a thick blanket of rock wool. These striking features are in addition to automatic temperature control, warming compartment and concealed drip tray.

The Century, Hotpoint's "second-in-command," gives the biggest dollar value in electric range selling. It is a typical Hotpoint product. Lusty in size with full cooking capacity but priced to appeal to a wider market. The Century gives buyers every bit as much cooking capacity and performance as higher priced ranges at a popular price.

Note the handy, quick-reference cooking chart visible through opening in back splasher. Let your customers twirl this disc and see how the basic instructions (readily available) simplify electric cookery. Show the sturdy steel construction, the stainless enamel top, the large oven and other appealing features. Discover how the Hotpoint Century will help you widen your range sales. Write for information. Edison General Electric Appliance Co., Inc., 5612 W. Taylor St., Chicago.

HOTPOINT'S SALES PROMOTION PROGRAM "CLICKS"

1. Complete line of modern electric ranges.
2. New popular prices open wider markets.
3. Direct factory sales help by specialists.
4. "Quarter Century of Progress" Spring sales plan.
5. A liberal co-operative advertising plan.
6. Sales promotion assistance that "clicks".
7. "On to Chicago" nation-wide retail sales contest.
8. Hotpoint La Salle sales training correspondence course.
9. Campaign planning service.
10. Convenient warehouse range stocks at 60 points.

Calrod, Hotpoint's speedy cooking coil, is optional at extra cost.

Oven vent on front of Chicagoan prevents discoloration of wall.

Stainless Enamel cooking and oven tops resist fruit acid injury.

Chicagoan's warming drawer holds complete dish service for eight.

Chicagoan's Lock-Stop extension shelves make low oven practical. No stooping.

HOTPOINT DISTRICT MANAGERS WILL CO-OPERATE WITH YOU

C. P. Myrick, 38 Chauncy Street, Room 1206, Boston, Mass.
M. H. Beckman, 416 West 13th Street, New York City
W. T. Christy, 203 Red Rock Bldg., Atlanta, Ga.
W. H. BonDurant, 5600 W. Taylor St., Chicago, Ill.
L. E. Buxton, 5600 W. Taylor St., Chicago, Ill.
H. K. Dewees, General Electric Supply Corp., 1801 North Lamar Street, Dallas, Texas
A. W. Peterson, General Electric Supply Corp., 1411 Walnut St., Kansas City, Mo.
B. E. Rowley, 1015 Continental Bank Bldg., Salt Lake City, Utah
C. N. Willard, 720 Union League Bldg., Los Angeles, Calif.
Clyde Allen, 846 Russ Bldg., San Francisco, Calif.
J. C. Platt, 2032 Second Ave., Seattle, Wash.

THERE'LL COME A DAY...

One of these days The West is going to snap out of this tail spin. All of a sudden we'll realize that we're short of homes, and short of a lot of modern appliances that should go into our homes. So much has happened since 1929, that almost anything in the way of an electrical appliance that hasn't been bought since then is almost obsolete.

It's a good idea to keep a weather eye on the barometer and not be caught napping. Stocks are low . . . far too low in many instances. Many of these stocks are of a kind that cannot be replenished on short notice. It's a fine thing to talk better business; it is a much better thing to plan for it. If we expect the lightning to strike, let's hoist a few lightning rods.

Edison

Southern California Edison Company Ltd.

The sensation of 1933!

A genuine Frigidaire that uses no more current than *one* ordinary lamp bulb!

AND SELLS FOR

*$96

Here's the lowest price that Frigidaire has ever featured. An economy story tuned to the times. Eye-appeal that instantly attracts prospects. And a name that has won a million more buyers than any other electric refrigerator.

NEW, SUPER SERIES ALL-PORCELAIN MODELS

Cabinets that set a new trend in style. Interiors electrically lighted. One-fourth more food space in the same sized cabinet. Shelves adjustable to any height. Double Hydrator space and a compartment for cold storage. Far greater ice capacity. All at new low prices.

INDIVIDUALIZED SALES SERVICE

Frigidaire offers these extra sales helps to Public Utility Companies.

1. An individualized sales service plan geared to the specific needs of the company using it.
2. 16 tested sales plans. All have brought extra sales and profits to one or more Utility Companies.
3. A plan for selling Frigidaire Air Conditioning Equipment on the same basis as an ordinary electrical appliance. Opens up new markets—new profit sources.

GET THE FACTS

Full details of Frigidaire's new lines for 1933 are now available. Also facts about the Individualized Sales Service for Utility Companies. Both point the way to greater sales and profits for 1933. Write today—stating when it will be convenient for a representative especially trained in Utility merchandising to call. Frigidaire Corporation, Subsidiary of General Motors Corporation, Dayton, Ohio.

Economy

An entirely new standard of economical refrigeration.

Convenience

Automatic defrosting. Automatic ice tray releasing. Extra room for tall containers. Cold storage compartment.

Beauty

Cabinet of gleaming, snow-white Dulux. Chromium hardware. Porcelain interior.

Quality

The dependability that has made Frigidaire first choice of 2,250,000 buyers.

●

¼ MORE FOOD SPACE

Due to new, scientific insulation.

FRIGIDAIRE

A GENERAL MOTORS VALUE

The New Approach to
SELLING LIGHTING
What 10 *men did in* 60 *working days*

THE General Electric Company at the request of the American Gas and Electric Company, has developed a new approach to selling lighting. It is built on the new *Science of Seeing* and presents an entirely new point of view.

This plan accomplishes three things: It secures the goodwill of the customers. It demonstrates the fallacy of cutting down lighting in an effort to economize. It ACTUALLY INCREASES LIGHTING LOAD. The success of this plan is shown by the following figures:

"10 men during 60 working days made 1,222 demonstrations. 285 analyses were submitted. Out of an increase of 528 KW recommended, 185 KW were *added*.

"Figuring 185 KW at $50 (estimated revenue per year) equals $9,250. 10 men's compensation at the rate of $37 per week equals $4,500. Cost of 10 lighting kits (1 kit per man at $100 each) equals $1,000. Deducting the total cash investment of $5,500 from the estimated revenue of $9,250 leaves a balance of $3,750."

Each month of the first five months of the American Gas & Electric Company's operation has shown an increase in results per man over the previous month.

Taking the performance of the original 10 lighting service men for the last three months of their first five months operation as a going rate the following results might be expected: 10 MEN WORKING FOR ONE YEAR:

3 calls per man per day for 260 days	7,800 calls
3 KW per man per week	1,560 KW
1560 KW at $50	$78,000
Salesman' compensation @ $150 per month	18,000
Revenue above Salesman's Compensation	60,000

This plan is now in active operation among other utilities and it is proving successful wherever it is operating. More and more utilities are adopting it every day. We will be glad to place at your disposal the experience gained in helping develop this plan. Write to the sales division which supplies you with lamps. General Electric Company, Nela Park, Cleveland, Ohio.

EDISON MAZDA LAMPS
GENERAL ELECTRIC

ELECTRICAL WEST

With which is consolidated the Journal of Electricity
McGraw-Hill Company of California

San Francisco, April 1, 1933

Volume 70
Number 4

G. C. TENNEY, *Editor*

E N G I N E E R I N G

Motorizing a Ditch Dredger

Individual Motor Drive Plus Variable Voltage Control On a Self-Propelled Gas-Electric Dredger Lowers Operating Costs and Reduces Canal Maintenance

By R. E. BEAR
General Electric Co., Los Angeles

IRRIGATING large tracts of reclaimed land by means of main and lateral earth canals involves a problem of maintenance which has brought about the development of very specialized machinery. In particular, the problem of canal cleaning has been the largest item, involving the removal of heavy growths of vegetation and large amounts of silt which accumulate and impede the flow of water.

Briefly, the requirements for a ditch dredger include the ability to travel along one bank of the ditch or to straddle the ditch and travel along both banks, at the same time continuously cutting silt and vegetation from the bottom or sides. Cutting is done by a rotating chain of sharp-edged buckets, so guided that each bucket after being filled is carried to the top of the bank before depositing the removed material. Refinements include the ability to vary the width of the dredger between its crawlers to accommodate different-sized ditches, to raise or lower the line of buckets for different depths and contours, to shift the line of buckets in a direction into or away from the ditch bank, and to travel and dredge at speeds satisfactory for widely varying conditions. A major problem is the proper application of power to all motions of the dredger.

One of the earliest machines was mounted on a wheeled chassis and powered by a 30-hp. gasoline engine driving a bucket line and a large cable reel, the latter used to propel the machine.

In subsequent designs, wheels gave way to caterpillar tracks mechanically driven from the same engine that drove the bucket line, with provisions for independently controlling either track in order to steer and maneuver the machine. As the machine must travel along canals of different widths, framework must be designed so as to allow the extension of one track, which naturally means a similar extension of the drive shaft of that unit.

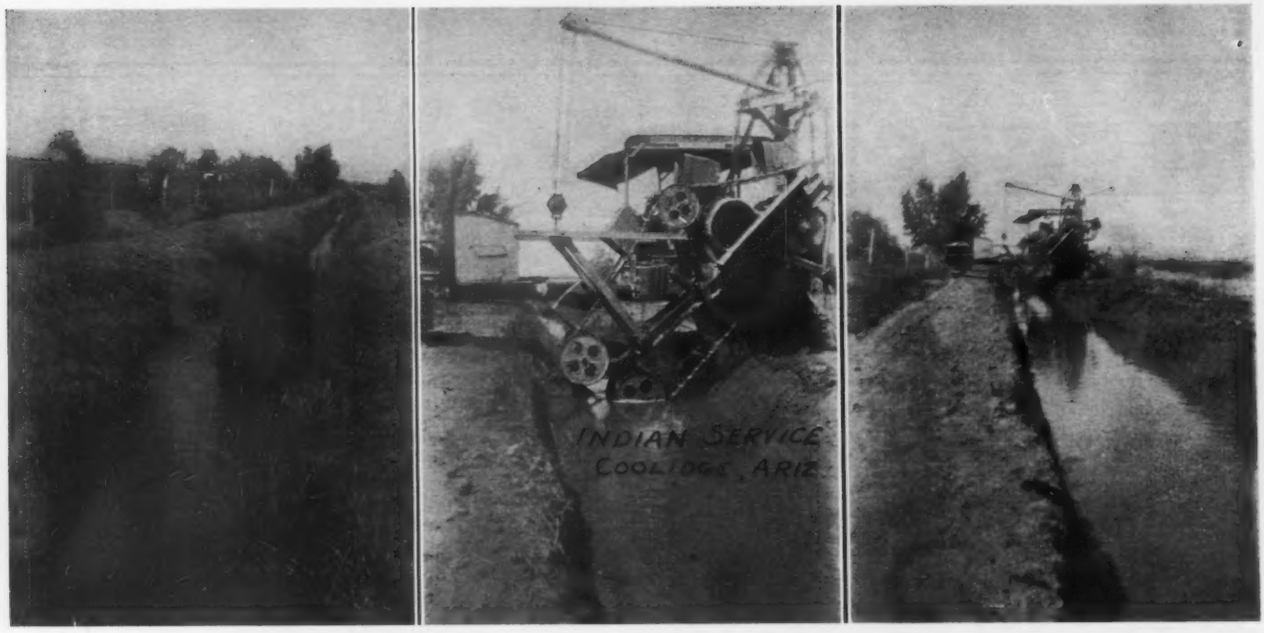
To increase flexibility and reduce maintenance and operating costs, an investigation was made of the practicability of individual electric motor drives for the various motions of the dredger. As a result, a new machine has been developed and is now in operation for the United States Indian Service at Coolidge, Ariz.

From the electrical standpoint, the system of applying direct-current motors to this machine includes some novel and unusual features: A gas engine drives two d.c. generators connected in tandem; one of these generators is rated at 20 kw., being compound wound with constant voltage characteristics, and the other at 15 kw., being shunt wound with variable voltage characteristics. The larger generator is self-excited and furnishes power for driving the 20-hp., bucket-line motor, the 2-hp. "shift" motor for transverse movements of the bucket system, and the 3-hp. "hoist" motor for raising or lowering the bucket line. In addition, this generator supplies field excitation for the shunt-wound machine through a standard field rheostat. Motors are mounted as integral parts of the framework, the bucket motor being controlled by a drum controller with a speed-regulating resistance, and the "hoist" and "shift" motors controlled through reversing drum switches.

While the operation of the bucket line, "hoist" and "shift" motors from the compound-wound generator presents no particular difficulties, driving the main and outdoor crawlers is a more complicated problem. It is necessary to provide an extremely wide range of speed controls to be able to operate continuously at any speed with good regulation, to keep the physical size and weight as low as possible and to maintain equal speeds on the two crawlers with no equalizing shaft between them. The largest part of the weight of the dredger is carried on the main crawler treads, with this proportion of weight increasing with the distance

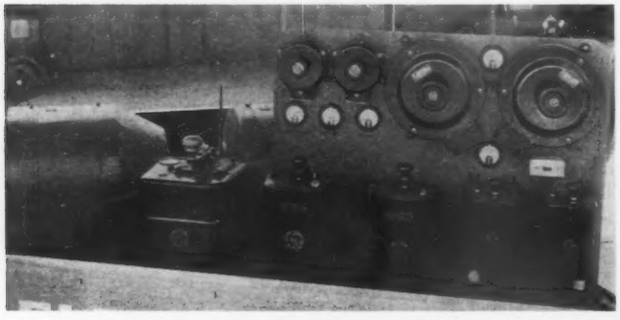
CONTENTS

Engineering	117
Commercial	122
Industrial	126
Motor Forum	127
Construction	130
Editorials	134
News	136
Meetings	140
Market Review	140
Barometer	141
Market Review	141
Barometer	142
Contractor, Dealer, Inspector	143
Personals	144



A gas-electric ditch dredger in operation. At the left is a canal partially stopped up by vegetation and silt. In the center the dredger is cutting down one side, across the bottom and up the other side, with the result shown at the right

between the two crawlers. In addition, the driving force necessary for each crawler fluctuates widely in accordance with the conditions of the ditch bank. Each of the two treads is driven by an individual shunt-wound motor; this makes it possible to extend the width of the dredger without the complication of extending the drive shaft, as the outboard motor is supplied through a retractable cable. Shunt-wound motors were chosen for their speed characteristics, speed being relatively independent of changes in load. The fields of the two crawler motors are separately excited with a 20-kw. generator, but the armature voltage is supplied to both of them in parallel by the shunt-wound



Operating controls for the gas-electric dredger. Contrast the neatness and accessibility of these five drum controllers and rheostats with the complicated lever system that would be necessary for the straight mechanical drives. The gasoline engine and two direct-current generators are mounted at the rear of the control panel

generator. A 5/1 range of speed is thus easily secured by varying the applied armature voltage, as many different speeds being available as there are divisions on the field rheostat.

For maneuvering the dredger on the ditch bank and for turning around, each crawler is equipped with a supplementary drum controller which allows either propelling motor to be started, stopped, reversed, or run at any of several intermediate speeds independent of the other. These supplementary controllers are in the full "on" position during normal dredging operations, the actual crawler speed being regulated by varying the armature voltage applied to the propelling motors. The machine is fitted with a gear-changing device which may be set either for a dredging speed of 4 to 20 ft. per minute or a road speed of 15 to 60 ft. per minute. This permits a minimum loss of time in traveling between jobs on the road.

In motorizing the dredger, the two crawler motors are rated for the horsepower required for maximum road speed. This means that a comparatively small amount of power is required at the slower speeds used in dredging. Consequently the gas engine need not be much larger than the horsepower actually required for driving the bucket line. Such an arrangement provides ample reserve power as well as reducing the over-all weight of the machine itself.

Contributing also to weight reductions is the variable voltage method of speed control which has essentially constant torque characteristics, as contrasted to the constant horsepower characteristics of the field-weakening method of speed variation. By using the for-

Five individual motors, two of which are shown here, drive each of the mechanical systems of the dredge. Economical use of power, lightness in weight and added flexibility are made possible by this type of design

mer, motors can be selected for minimum physical dimensions and weight with equivalent lower first cost. As the crawler motors are supplied from the shunt-wound generator, having a drooping voltage characteristic, the load on the machine is limited to a safe value. This feature is an adaptation of the modern electric shovel design.

Electrifying the dredger has resulted in the elimination of many heavy mechanical parts characteristic of the gas engine drive. A much higher over-all efficiency is secured both because such parts are eliminated and because an economic application of power is possible by individual motor drives on each of the mechanical systems of the dredge. The new machine is a product of the Ruth Dredger Mfg. Corp., of Los Angeles, one of the early pioneers in equipment of this type.

▼ ▼ ▼

Air Conditioning Costs Analyzed

From Experiences With Its Own Building, Air Conditioned Nine Years Ago, This Utility Furnishes Comprehensive Data on Operating Costs and Economics

By G. E. ZELHART
Sales Engineer, San Joaquin Light & Power Corp.

BECAUSE air conditioning is relatively new, figures on operating costs and economics involved are available only from a few sources. Rare, indeed, is the building which has been completely air conditioned for nine years, as has the 10-story office building of the San Joaquin Light & Power Corp., at Fresno, Calif. This company, realizing that the extremes of temperatures experienced in the inland valleys of California would force the adoption of some form of air conditioning, just as soon as the equipment was mechanically practical, determined to investigate the possibilities and practicability by actual trial, so as to learn the facts and to provide every mechanical aid which would promote the health, comfort and efficiency of the employees. Consequently, when the headquarters structure was completed in 1924, it was the first in California so equipped.

The building has a total cubical content of 1,200,000 cu.ft. and a floor area of 101,800 sq.ft.; a heating plant was a necessity even in the comparatively mild winter climate of Fresno. It was the installation of machinery to provide clean, cool air during the summer season which was an innovation in building practice. Producing comfortable conditions during the summer meant reducing the temperature of the air from 18 to 20 deg. without an undesirable increase in relative humidity. As the total cost of the building was $1,200,000, and the entire air-conditioning system, including heating, cooling and ventilating apparatus installed, cost $122,600, the ratio of air conditioning equipment to building cost was 10.89 per cent. It was estimated that an adequate heating system alone would have cost $60,000, giving a cost ration of 5.35 per cent; the cost of a ventilating system alone was estimated at $33,875, a ratio of 3.02 per cent; and the cost of a cooling system alone was figured to be $28,165, or 2.52 per cent. Cooling equipment, therefore, is a relatively small percentage of the building cost, particularly when it is considered that this installation required refrigerating equipment to chill the spray in the air washers so that the relative humidity of the building air could be kept low enough for maximum comfort. Ordinarily a cooling tower will provide spray water at sufficiently low temperature to maintain humidity within the comfort zone.

The air conditioning installation has operated with complete satisfaction during the past nine years. Its most notable effect has been on general working conditions in improving efficiency, raising the morale and safeguarding the health of the employees. Conditioned air has not only kept the building modern, but, in addition, has reduced depreciation and maintenance to a minimum. Today the walls and ceilings are practically free from dust or smoke deposits and janitor service has been relieved of its once weightiest burden.

Naturally, intangible benefits, such as the health, morale and efficiency of employees, are difficult to measure in dollars and cents, but an analysis of the operating costs of this particular installation brings to light interesting information and data which may be a valuable guide for future reference. Table I shows the total cost of refrigeration and air washing during 1931; in computing the cost per kilowatt-hour, the motor load on the air conditioning equipment was prorated, being only a part of the total motor load in the building. Demand and kilowatt-hour values on the two compressors, forming the greater part of the air conditioning load, are actual monthly readings. Water in the air washer is recirculated; while there is some evaporation during the periods of low relative humidity, the loss of water is partially compensated for by conden-

TABLE I
Costs of Refrigerating and Washing Building Air

1931	Compressor No. 1 Demand	Compressor No. 1 Kw.-hr.	Compressor No. 2 Demand	Compressor No. 2 Kw.-hr.	Air Washers* Demand	Air Washers* Kw.-hr.	Total Demand	Total Kw.-hr.	Cost per Kw.-hr. in Cents	Elec. Bill	Condenser Water in Gallons	Water Bill
Jan.	....	....	....	....	11.0	4,920	11.0	4,920	1.9172	$ 94.33	.....	.....
Feb.	....	....	....	....	11.0	4,920	11.0	4,920	1.6434	80.86	.....	.....
Mar.	....	....	....	....	11.0	4,920	11.0	4,920	1.7635	86.76	.....	.....
April	56.28	320	59.50	400	11.0	4,920	126.78	5,640	1.7445	98.39	812,458	$ 24.38
May	56.28	1,680	59.50	5,000	11.0	4,920	126.78	11,600	1.5613	181.11	1,014,958	30.45
June	58.96	6,840	58.96	3,720	11.0	4,920	128.92	15,480	1.5536	240.50	3,009,958	90.30
July	64.32	24,280	64.32	24,560	11.0	4,920	139.64	53,760	1.1930	641.36	4,643,458	139.30
Aug.	67.00	25,240	69.68	25,840	11.0	4,920	147.68	56,000	1.0408	582.85	6,177,208	185.32
Sept.	64.32	10,280	67.00	9,320	11.0	4,920	142.32	24,520	1.3065	320.35	4,350,208	130.51
Oct.	48 24	200	....	....	11.0	4,920	59.24	5,120	1.6018	82.01	225,450	6.74
Nov.	....	....	....	....	11.0	4,920	11.0	4,920	1.6588	81.61	.....	.....
Dec.	....	....	....	....	11.0	4,920	11.0	4,920	1.7343	85.33	.....	.....
Total ..		68,840		68,840		59,040		196,720		$2,575.46	20,233,698	$607.00

* No sub-meter; values estimated.

sation when the relative humidity is high, with the result that the quantity of make-up water is negligible. Cooling water for the ammonia condensers is purchased from the Fresno Water Department at the regular commercial rate. The head pressure in the air washer being constant, the demand on the pump motors is also constant, and since the washers operate approximately the same number of hours per day throughout the year, the kilowatt-hour can be closely estimated. Thus, operating costs shown in this tabulation are believed to be accurate to within a fraction of 1 per cent.

To get at the total cost of operation, interest on investment as well as maintenance, depreciation and labor must be taken into consideration, for it is obvious these charges are the largest part of such cost, as shown graphically in an accompanying chart. That a more comprehensive study of the subject may be made, the cooling and heating are set up for comparison. Operating costs and fixed charges of air washing and ventilating, being applicable to both heating and cooling systems, are prorated according to the number of hours used in conjunction with each system.

Total Heating and Cooling Cost for 1931

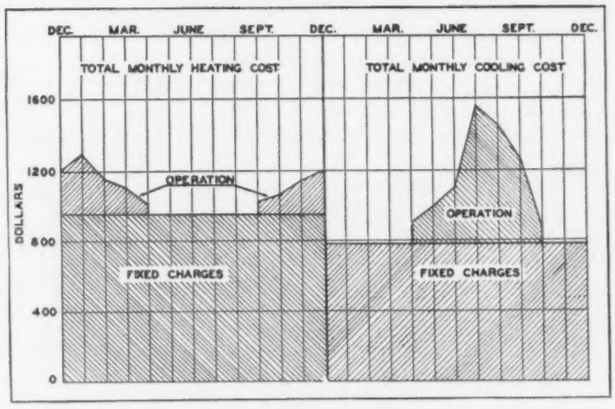
	Heating	Cooling	Total
System operation and maintenance cost	$5,097.51	$7,442.65	$12,540.16
Prorata of ventilation operating and maintenance cost	850.13	997.97	1,848.10
Fixed Charges			
Interest on investment	4,200.00	1,971.55	6,171.55
Depreciation	1,200.00	563.30	1,763.30
Interest on prorata of ventilating investment	1,090.74	1,280.44	2,371.18
Depreciation on prorata of ventilating investment	311.64	365.84	677.48
Total	$12,750.02	$12,621.75	$25,371.77

From this tabulation, the cost of operating the cooling system is shown to be slightly less than the operating cost of an adequate heating system. To further analyze the case at hand and to answer the question of cost more completely, the following unit costs were established from the preceding figures:

Unit Cost—1931	Heating Washing & Ventilating	Cooling Washing & Ventilating
1. Per 1,000 cu. ft. of conditioned space per year	$10.625	$10.518
2. Per 1,000 sq. ft. of conditioned floor space per year	$125.246	$123.986
3. Per 1,000 sq. ft. of rentable conditioned floor space per year	$158.38	$156.547
4. Per degree temperature difference per 1,000 cu. ft. of conditioned space per year	$0.787	$0.496
5. Per degree temperature difference per 1,000 sq. ft. of conditioned space per year	$9.277	$5.848
6. Per degree temperature difference per 1,000 sq. ft. of rentable conditioned floor space per year	$11.714	$7.384
7. Number of 8-hour days of actual operation*	118.20	219.40
8. Per degree temperature difference per 1,000 cu. ft. of conditioned space per 8-hour day of actual operation	$0.0042	$0.0023
9. Per degree temperature difference per 1,000 sq. ft. of conditioned space per 8-hour day of actual operation	$0.049	$0.027
10. Per degree temperature difference per 1,000 sq. ft. of rentable conditioned floor space per 8-hour day of actual operation	$0.062	$0.034
11. Number of employees	450	450
12. Per man-year	$28.333	$28.048
13. Average temperature change	13.5 deg. F.	21.2 deg. F.

* In determining No. 7, the total number of hours of operation during the year was taken from the log sheet and divided by eight.

Savings can be estimated only partially at present, for each year additional benefits derived from the use of conditioned air become evident. Building depreciation, obsolescence and janitor service are reduced. Important as these items are, they appear insignificant when compared with the relative increased efficiency



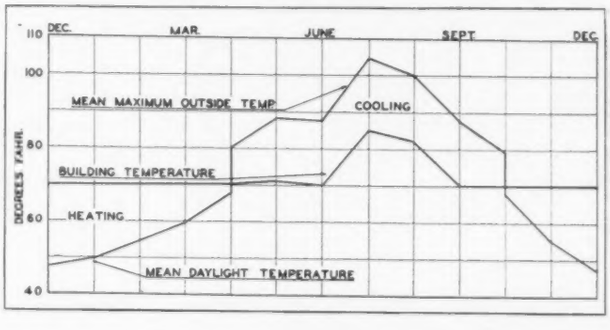
Graphical allocation of air conditioning costs in the San Joaquin Light and Power Co. building at Fresno, Heating and cooling charges, indicated by the shaded portions of the chart, are approximately equal during a year's operation

among the office employees. It has been conservatively estimated that the use of conditioned air improves the yearly efficiency among office employees by 10 per cent; this alone is sufficient to justify its cost. San Joaquin Light & Power Corp. has found that conditioned air actually pays dividends.

Air conditioning involves the counteraction of high and low temperature, the correction of humidity and the purification of air. The question of proper temperature is a subject of much discussion: It is generally accepted that a room temperature of 68 deg. F. is adequate during the winter season; there are some who believe a similar temperature should be maintained indoor during the summer. Experience indicates this is not always true. Too great a difference in temperature, if suddenly encountered, as on entering or leaving a building, may produce shock which results in colds, stiff muscles or other physical ailments. Therefore, in the interest of good health during high summer temperatures, the San Joaquin building is maintained at a temperature of 18 deg. below outside temperature, but not lower than 70 deg. As will be seen from an accompanying curve, the inside temperature during 1931 varied not more than 15 deg. throughout the entire year.

With modern air conditioning equipment, practically any percentage of relative humidity may be obtained. It has been found, however, that air too dry, of too low relative humidity, produces throat and nasal discomfort, while a too high percentage of relative humidity produces a "sticky" atmosphere. So a relative humidity of from 40 to 45 per cent is maintained with most healthful and satisfactory results. Uniform humidity control, uniform temperature and air washing, however, are

These curves of the relationship between building and outdoor temperatures show the need for air conditioning equipment to maintain maximum physical comfort and efficient working conditions



not all the treatments to which the air is subjected in this building. To further safeguard the health of employees, the air is charged with a small percentage of ozone as a protection against colds and other infectious diseases.

▼

Complaints Checked With Customer

By E. C. GOODALE
Tacoma, Wash.

GOOD public relations demand that complaints be settled quickly and to the customer's complete satisfaction. Checking the frequent statement that an overcharge has been made often involves reference to complicated billing records or the use of a rotating test standard on the customer's meter, neither of which can thoroughly satisfy the average layman, unversed in matters electrical. In the final analysis, he can do nothing but accept the word of the billing clerk or testman that the bill is correct; on the other hand, if the customer could satisfy himself that the meter is correct, the complaint could be settled more to his satisfaction. And it is possible to check both the accuracy and power demand from the customer's meter with no other external apparatus than a watch and a knowledge of meter operation.

The most useful, convenient and easily-learned method of using the watt-hour meter in this way is to determine the watt-minute constant of the meter and then multiply this by the disk revolutions per minute. The product is the load on the meter, in watts. The watt-minute constant of any direct-connected meter is equal to 60 times the watt-hour constant, the watt-hour constant in modern meters appearing on the nameplate as "K_h." Suppose, for example, the watt-hour constant is 1/3, as is so often the case in 5-amp., 115-volt, single-element meters. Then the watt-minute constant will be $1/3 \times 60$, or 20 watts per revolution per minute: A load of 40 watts will make the disk rotate two times per minute, a 60-watt load three times per minute, etc.

Oftentimes when the serviceman or meterman comes in contact with a customer who imagines he or she is being "over-metered," it will take but a second to have the customer turn on a 60-watt or other convenient size light and check the meter rotation with the customer. The service-man first tells the customer how many revolutions the light should make the disk rotate and then he and the customer together check it, the ordinary second hand on a watch being sufficient for most cases. The customer must be made to understand that the check is an approximate one only, as lamps seldom take exactly their rated watts, particularly if the voltage is not exactly as stamped on the light. Usually, however, a check on the meter in this manner means more to the customer than an elaborate or even regular meter check with rotating standard, the reason being that you are using the same load that he uses and that you are able to predict the results in advance of the test. It can be explained to the customer that he can make a similar test on his neighbor's meter in this way if he chooses a meter of the same nameplate rating and make as his own. One further caution to the customer is to be sure the meter is not rotating at all before the check load is turned on; oftentimes the source of a high bill is brought to light in making such tests as these.

Older types of meters do not have the watt-hour constant appearing on the nameplate. In such meters it usually will be found written on the disk. All Westinghouse meters have disk constants which vary in direct proportion to the ampere rating, to the voltage rating, and to the number of elements. The basic 5-amp., 115-volt, single-element meter has a watt-hour constant equal to 1/3 and, therefore, a watt-minute constant, K_m, equal to 20. The disk constant of any other meter can be found by multiplying this disk constant by (amp./5 $\times$volts/115$\times$elements/1.) For example a 25-amp., 230-volt, two-element Westinghouse meter has a watt-minute constant of 20 ($5 \times 2 \times 2$) or 400 watts per minute per revolution. A load, therefore, which will turn the disk thirteen times per minute, will be 400×13, or 5,200 watts.

Some of the other manufacturers also vary the disk constants in the same manner, so that once the disk constant is known for their basic 5-amp., 115-volt., single-element meter, it can be figured for any meter of the same type in their line. For other makes, however, it is safest to find the watt-hour constant either on the nameplate or on the disk and divide by 60 to get the watt-minute constant.

When instrument transformers are used with the meter, unless they appear on the nameplate and are included in the given watt-hour constant, there is a further multiplier, K_t, to be used in determining the true watts. The true watts then are $K_t \times K_m \times$ r.p.m. K_t is the product of the current transformer (if any) and potential transformer ratios. Suppose a meter has a watt-hour constant of 2 2/3: K_m will be $60 \times 2\ 2/3$, or 160. If current transformers only are in use and their ratio is 50/1, then K_t is 50. The true watts then are $160 \times 50 \times$ r.p.m., and if the load rotates the disk twelve times per minute the watts will be $50 \times 160 \times 12$, or 96,000 watts.

With a meter whose disk constant, K_m, is equal to 40 (corresponding to K_h equal to 2/3) and potential transformers 20/1 and current transformers 80/1, K_t then is 20×80, or 1,600, and $K_t \times K_m$ is $1{,}600 \times 40$, or 64,000. The revolutions per minute multiplied by 64 will then be the kilowatt load, direct. This assumes that both potential and current transformers are on the same side of all power transformers or auto-transformers. If the current transformers are on one side and the voltage transformers on the other side of an intervening transformer bank, a further multiplier, K_b, is necessary.

It is evident from the foregoing that a power company employee who has frequent access to consumers' premises should put himself in readiness to be able to check all kinds of loads when the occasion arises, the watt-hour meter and a watch usually being all the apparatus necessary.

▼

Soil-Heating Cable Applied to Pipes

PIPES carrying viscous liquids that move slowly present a condition which requires excessive horsepower for pumping in order to maintain the volume required in many industrial processes. Movement of these heavy fluids can be speeded and the pumping load reduced is some provision is made for warming the pipes even a few degrees. In a recent installation, lead-covered, soil-heating cable was wound in a spiral around the outside of piping carrying molasses. The cable is rated 6 watts per ft. and supplies adequate heat to speed delivery and cut down the pumping load. Application of this principle to refineries, soap factories and similar industrials is practical because of the inexpensiveness, ease of installation and ability of the cable to be served from any 115- or 230-volt circuit.

Northwest Dealer Relations Improve

By BERKELEY SNOW
Secretary, Northwest Electric Light & Power Assn.

HEADWAY in bettering the relationship between utility companies and non-electrical retail outlets is being made in the Northwest. At least, improvement is noted in utility relations with hardware dealers, as disclosed by sentiments expressed and actions taken at the recent conventions of the three state hardware associations in that territory: Idaho Retail Hardware & Implement Dealers Assn., Boise; Pacific Northwest Hardware & Implement Assn., Spokane; and Oregon Retail Hardware & Implement Dealers Assn., Portland. Some of the following facts about these meetings have been gleaned from "The New West Trade," of Spokane, issue of Feb. 11, carrying a "Convention Section" reporting complete proceedings.

Spokane Convention

Most positive action of any of the conventions was taken at Spokane, where the following resolution was adopted:

"That they commend the Utility Contact Committee for its good work, accepting its report, expressing appreciation of the cooperation of Lewis A. Lewis of The Washington Water Power Company, and the other utility men and companies in the Pacific Northwest. And urging dealers to cooperate with local managers in carrying out the cooperative policies decided upon."

This resolution followed a report by the utility contact committee, presented by John C. Lampert of Yakima, Wash., in which he told of conferences with the utilities of the Pacific Northwest and agreement to adopt a set of cooperative policies somewhat along the lines of the N.E.L.A. utility merchandising principles. Leading up to the committee report was a talk by Lewis A. Lewis, assistant general manager, The Washington Water Power Co., in which he stressed the necessity for utility promotion of new appliances before they became sufficiently "accepted" by the public to become attractive as merchandise, and in which he graphically brought out the way the public interest had been served by increased utilization and consequent lowering of rates for service.

In the keynote speech of this convention, J. T. Elson, manager, Marshall-Wells Co., Spokane, took occasion to refer to the utility merchandising situation in the following language:

"Home electrical appliances will be good merchandise to handle, and I want to emphasize the changed attitude of the utilities and their desire to better cooperate with merchants in the selling of electrical goods, as evidenced by the code of ethics recently issued by The Washington Water Power Co."

Portland Convention

Less impressive in results, but more dramatic in the manner of it presentation, and withal containing much hope from the standpoint of the utilities, was the discussion of the subject at the Portland convention. Here A. C. McMicken, general sales manager, Portland General Electric Co., was to have appeared on the program on the opening day, Feb. 7. It happened, however, that this was the day of the hearing before a senate committee on two bills that would have put the Oregon utility companies out of the merchandising business, and Mr. McMicken found it necessary to have his talk postponed until the following day. Taking his place on the program, A. C. Gilbert, president, Portland Hardware and Electric Co., lead a vigorous and able attack on utility merchandising, but utilizing some arguments based on apparent misinformation and decrying some competitive practices once engaged in but now superseded by more enlightened methods.

This speech led to the passage of a resolution commending the bill before the Oregon senate, and the appearance of a representative at the hearing that night in Salem to present it to the committee. (EWEST, March 1, p. 104.)

On the following day Mr. McMicken appeared on the program with an excellent presentation of the utility side of the question, bringing out the fact that utility promotion as a part of utility merchandising was necessary if any retail outlet was to enjoy good business in most electrical appliances. He also portrayed the nature of the public interest involved, a point so frequently misunderstood by the not-strictly-electrical retail merchant. There followed a spirited discussion ending in action reported by "The New West Trade," as follows: "The exchange was mutually enlightening and finally a degree of harmony prevailed, and a suggestion, emanating from the dealers themselves, that the president-elect appoint a contact committee to confer with the representatives of the utilities, was adopted."

Boise Convention

On a more even keel was the discussion of the subject at the Boise meeting, the Idaho association having arrived at a measure of understanding at last year's convention, when the group decided against proposing anti-utility merchandising legislation and agreed to try mediation instead. A. E. Thiel of Montpelier, Idaho, chairman of the utility contact committee, opened the discussion, saying in part:

"The committee was at first inclined to urge legislation against the power companies. After meeting with the utilities we decided to withdraw legislation and work on a cooperative basis. I have not received a single complaint in 1932 as a member of the committee."

L. W. Brainard, sales manager, Idaho Power Company, followed, telling of the policies of dealer cooperation now in effect in his company's promotional program and showing how dealer sales under this plan had increased in 1932.

A generally encouraging aspect of the situation in the hardware trade in the Northwest was the eminently fair and unbiased treatment of the subject at all three conventions by "The New West Trade." This organ of the hardware industry in that territory should be commended by utility men for the comprehensive manner in which it reported the proceedings, according as much space to the utility side of the question as it did to the other side, and selecting from the talks of the utility men appearing at the meetings those parts of their presentations most pertinent to the subject. With a trade press evidently bent on seeing that its constituents receive adequate and accurate information on this most controversial of subjects, there is hope that the clouds of misunderstanding that have enveloped it may be completely dispelled to let the sunlight of mutual helpfulness prevail for the good of all concerned.

Sales Barriers

Being a Letter to the Editor From a Contractor - Dealer — and an Answer

Editor, ELECTRICAL WEST:

As we are interested in selling electrical equipment on a profitable basis, ideas which may be propounded from time to time regarding the sale of equipment naturally attract our attention.

Our experience has been that the price of the equipment and the installation costs are the easiest barriers to surmount. This, of course, precludes the possibility that the customer is not oversold in proportion to his needs and means. We have found also that it is a comparatively simple task to convince him that it is in his interest to pay a little more for his installation and have service capacity for additional equipment which may be purchased at a later date. Conversely, we have found that, when the customer has, say, a 60-amp. service installed to operate a range and desires to purchase a heavy-duty air heater, it takes considerable sales effort to convince him that he should buy the heater to fulfill his needs and increase his service capacity in order to operate the heater. He immediately, and rightfully so, feels that he has been "sold something," and wants to know the reason that his service has no surplus capacity, as he paid for a "heavy-duty" service at the time he installed the range. A little sales effort in this direction will pay dividends at the time the customer desires to increase his connected load.

At the time the writer wired for his range, he used a 100-amp. switch, a 60-amp. branch for the range and capacity for air and water heating. In the January number of ELECTRICAL WEST there appeared a letter entitled "Sales Hypocrisy," by W. E. Cranston, Jr., and the writer, as he has given considerable thought to the domestic market, suggests some improvements. You will note that (my) service allows capacity for additional equipment; when the local utility rates should justify the installation, it is but a simple task to add a water heater and make a 100 per cent electrical home. This brings us to the greatest barrier—selling the utility that is to supply the service and justifying its rates. The customer knows that he pays the stipulated price for his equipment and the same for his wiring, and he hands the contractor his check. Then the utility regularly reminds him of the operating costs long after the amount paid the contractor has been forgotten. The operating cost is the thing that today is holding up the more rapid development of the domestic market. In his letter, Mr. Cranston criticizes the men in the electrical industry in that they have "stuck to gas because it is cheap." The public has the same reason. If electricity were as cheap as gas, there is no question but the contractor-dealer would be doing a large part of the business that now is going to another industry.

The local utility is in the merchandising business, and the various contractors, in rotation, have installed ranges sold by the utility at the stipulated price of $40 per range. This figure covered a minimum installation (60 amp.) and was added to the list price of the range as quoted to the customer. After making vigorous denials that it contemplated any cut in installation price, this same utility recently informed these contractors that, due to present economic conditions, the costs of this installation have decreased and it will now pay the contractors $31 per range, this price to be added to the list price of the range sold. These same economic conditions are affecting the contractor-dealer, the public and the utility, so it is logical to assume that utility costs have decreased a like amount. With a 22½ per cent reduction in domestic rates, there would be no excuse for anyone within or without the industry to stick to gas because it is cheap.

In this manner, the utilities can cooperate with the contractor, the manufacturer and the wholesaler, and the electrical industry can lead business out of the depression.

D. S. McMILLAN,
McMillan Electric Shop,
Santa Paula, Calif.

ELECTRICAL WEST for years has emphasized the necessity for adequate wiring. The electrical industry today is checkmated to a large extent in the extension of its goods and services into homes, factories and commercial buildings, by its failure to sell an adequate wiring installation at the time the building initially was constructed. In the majority of cases, the blame for this situation rests squarely on the shoulders of the industry itself. As Mr. McMillan points out, the consumer has a right to expect adequacy at the time he builds. Until the whole industry cooperates in a program to sell adequate wiring, we will have this sales resistance with us when soliciting the purchase of some of the new and modern electrical equipment and appliances now available to the public.

Red Seal for homes and commercial buildings, when backed by full industry sales support, will overcome this problem in new structures. As yet, however, no satisfactory solution has been offered for the millions of old homes and offices which form a tremendous potential electrical market. Perhaps re-inspection and rewiring is the answer; seemingly insurmountable difficulties here can be overcome. There must be some equitable spread of the cost of such promotional effort among all those branches of the industry which would benefit. The contractor alone cannot be expected to bear the cost of such a program out of the profit he might expect from such jobs. We are hopeful that some day a test program can be undertaken in a representative community so as to determine just what the costs would be and just what results would be accomplished.

Without holding a brief for the utilities, we do believe that the industry should consider fairly a few facts regarding rates. Cost of living generally is still higher than the 1913 average; electric rates are appreciably lower—in California the spread between the two is about 56 per cent. In times of abnormal prosperity, such as 1925-29, the utilities' earnings were restricted by law to "a fair return, in no case to exceed 8 per cent on the fair value of the property used and useful in the public service." As a matter of fact, California utilities have been restricted by the railroad commission to a figure lower than that permissible by law. Not having been permitted to share in the feast, is it just to force them today to share in the famine?

The major item of cost of utility service is not the labor or materials which make up operating expenses; it is the fixed charges upon plant facilities designed of necessity to furnish service to electrical demands of the order of 1928 and 1929. It is in taxes which, in the case of various utility companies here on the Pacific Coast, range from 11 to 20 per cent of their entire gross revenues (and yet, legislators are proposing additional tax burdens in many Western states). With the decreases in load and kilowatt-hour sales of the last three years, these fixed charges and taxes have had to be spread over fewer and fewer kilowatt-hours, with the consequence that emergency retrenchment measures have been necessary to maintain rates at the present levels. Even in the face of these facts, the increasing competition from other sources of power, plus growing public insistence, may force downward revisions which are not warranted llegally.

One of our pet theories as regards rates is the need for greater simplicity. It may not be practicable, but we feel, like a few of the utility executives, that if electricity could be sold in units which were understandable to the layman, much of the talk of high operating costs would disappear. It may be the problem's real solution. We know just how much mileage we get out of the old car when we drive into a service station; instead of thinking of the per-gallon price, we think of the per-mile cost of a penny or so. We know just what we buy when the milkman sells us a quart of milk; not

so when the monthly electric bill comes along and says: "167 kw.-hr.....$6.56."

How much more understandable—and salable—would be the itemized statement:

For burning lights 120 hours	$0.48
For operating radio 100 hours	0.50
Washing and ironing three times	0.17
Toast and coffee, 30 breakfasts	0.12
Cleaning house twice each week	0.07
Refrigeration, including ice for three parties and five frozen desserts (Not to mention $3.65 worth of food saved)	1.20
Cooking 71 meals (Credit household budget $2.12 for food saved and $1.25 as 1/24 of cost of painting kitchen if other fuel were used)	4.02
Total	$6.56

Mrs. Editor kicked about the electric bill periodically—and who doesn't? But she stopped when it was interpreted to her in terms such as these; now she thinks electricity is the cheapest thing she buys. If someone will only invent an electric meter which will register in such units, the job of selling electric service and appliances is going to be a lot simpler. And that is what we mean by simpler rates.

▼

Street Lighting In the Small Town

By CRAIG P. ELIOT
The West Coast Power Co., Aberdeen, Wash.

PROPER street lighting is an asset to the smallest as well as the largest community; in both, the same need exists for the promotion of safety and convenience at night through adequate visibility, for the enhancement of the community value of the street, and for the promotion of a better appearance. However, financing an ornamental street lighting system becomes increasingly difficult as the size of the town decreases, due to the rapidly decreasing financial concentration characteristic of commercial areas. In the smaller towns, the formation of an improvement district to finance the installation becomes practically impossible and it is nearly as difficult for the community as a whole to be persuaded to make the required investment.

The West Coast Power Co., with its associated properties, operating almost exclusively in a territory composed of towns of 500 to 3,000 population, has attacked the problem of selling adequate ornamental street lighting to small towns from three different angles. This utility has worked up a company finance plan which offers the prospective community a means of purchasing adequate street lighting as a commodity. Under this scheme the community buys neither equipment nor kilowatt-hours. The company undertakes the entire installation, operation and maintenance of the system, charges for this street lighting service being composed of the following items, which are totaled and divided into monthly payments per lamp:

1. **Fixed charges on the investment:**
   - A—Interest and profit..... 8%
   - B—Taxes and insurance..... 3%
   - C—Depreciation 5%
2. **Maintenance:**
   - A.—Glassware renewals..... 5% per year
   - B—Post renewals..... 2% per year
   - C—Painting posts..... 1 coat per year
   - D—Miscellaneous maintenance. $3 per unit per year
3. **Operation:**
   - A—Lamp renewals.....3 times per year
   - B—Cleaning glassware.....4 times per year
   - C—Energy (based on calculated consumption plus losses)

Because this scheme is unusually flexible, it is possible for the community to purchase whatever amount of street lighting may fall within its budget. Investment charges may be minimized by a careful design of the installation. The size of the total street lighting system in each of these small communities has made it possible to use one constant current transformer for both the ornamental and overhead systems. In one instance discarded cast-iron posts were repaired, cleaned, painted and worked into a very presentable system. By scheduling street lighting construction in conjunction with street improvements, it is possible to avoid the cost of tearing up and replacing pavement.

Operating charges, consisting of the charge per lamp, will vary greatly depending upon a number of factors, the most important of which is the lamp size. In many cases it has not been possible to sell ideal lighting as recommended by N.E.L.A. standards; it often is necessary to compromise on smaller lamps and greater spacings than are most desirable in order to secure the original installation. In so doing, an attempt has been made to sacrifice the lamp size rather than the spacing, in so far as possible, since lamp size may be increased much more readily than the spacing can be rearranged when conditions within the community indicate the desirability of most efficient illumination.

One such installation was made at Burns, Ore., replacing a system of 1,000- and 2,500-lumen series lamps suspended over the street intersections. Seven of these were removed and 42 standards were installed, opposite each other at each side of each intersection and in the center of each block, covering seven blocks through the business district. The corner standards (four at each intersection) were equipped with 1,000-lumen lamps and those in the middle of the block with 2,500-lumen lamps. The cable had already been laid by the city at the time of paving the main street about a year earlier, and was purchased in place from the city. The standards used were second-hand and equipped with plain glass globes and canopies. The cable loops at each standard location were short, so the circuit was extended to the top of the standard by the use of 3,000-volt, rubber-covered strand solidly spliced to the cable. No cutouts or transformers were used in the standards, each being grounded to a 5/8x8-ft. ground rod driven in the bottom of the excavation for the foundation. The ornamental circuit was cut in series with the overhead system at the most convenient spot and the constant current transformer changed from 10 kw. to 15 kw. At the point of connection with the overhead lines, the cable was protected by lightning arrestors and the special protecor assembly, mentioned before, was mounted at this point. Investment in this system is approximately $4,250.

Another completed system is at Alturas, Calif. That system consisted of multiple lamps in pole brackets, fed from existing distribution secondaries without means of control or metering, burning 24 hours per day. The ornamental system installed consists of 22 metal standards with 15-ft. light centers equipped with Form 8 Novalux units with alabaster rippled-glass globes and canopies. The installation covers six blocks of the principal business street (four blocks 200 ft. and two blocks 300 ft.). The units are placed two at each intersection diagonally and are staggered 100 ft. apart between intersections. All are equipped with 4,000-lumen lamps. Single conductor No. 8 Parkway cable was laid in conjunction with a street improvement and paving program and the standards were erected immediately thereafter. Remaining details of the installation are identical with the Burns job already described. Five highway lighting brackets with 4,000-lumen lamps

and Novalux 45-L pendant type units with B Sym-Etric refractors were installed farther along the street at the same time and constitute the whole of the overhead series circuit at the present, although it is expected that the series system will be extended to replace all of the multiple units as soon as an increased budget can be passed by the city. This system, as installed, cost approximately $6,200.

That ornamental lighting systems are well within the reach of the smaller communities is illustrated by the charges which cover the cost of the street lighting service. At Burns, the 1,000-lumen lamps cost the city $3 each per month and the 2,500-lumen lamps $5 per month. If any of these are later increased to 4,000-lumen size, the charge would be $6.50 each per month. At Alturas, with the more expensive standards and smaller number of units, the ornamental lamps of 4,000-lumen cost the city $7.75 each per month and if increased to 6,000 lumen would cost $9.75 each per month. The highway brackets with 4,000-lumen lamps cost the city $5 each per month, which would be increased to $6.50 for 6,000-lumen lamps.

A very considerable saving in the installations was effected by omitting the series transformer in each standard and carrying the circuit solidly through each lamp. To give a measure of protection, however, should a standard accidentally be broken off and the circuit broken at that point, a somewhat unusual application was made of a film cutout originally intended for use with series transformers. Two of the film cutouts are placed across the series çircuit adjacent to the underground cable connection, with a ground connection between them. The rating of the disc film used is such that an open in the ornamental circuit will cause the films to break down and ground the series circuit at this point. This removes the high open-circuit potential from the underground system and establishes ground potential on the cable. Incidentally, it also serves to maintain service on the balance of the series system in the case of such a break on the underground circuit.

▼

Lighting a Lamp Without Wires

ONE OF the oldest window tricks is that which utilizes an electric lamp which lights, although no connections are visible. And even though it is an old trick, it is one of the least understood and, consequently, one of the best.

Two variations are especially popular: one has the lamp resting in a glass tumbler, the other has the lamp on a flat plate of glass. Simplest is the first: Have a jeweler drill two tiny holes through the base of the tumbler, as shown in the drawing. Then solder two very fine wires to the base of the lamp, one to the eyelet and the other to the brass shell. These wires are run through the holes and connected to a lamp cord underneath a drape or box, on which the tumbler rests. The lamp will have to be upside down in the tumbler, of course.

More difficult is the other variation. Carefully wiggle the brass base loose from the bulb, so that the two fine wires which connect to the filament may be drawn outside through niches cut in the brass. Exercise care that the bulb is not broken, spoiling the lamp; it may be best to practice on a burned-out lamp before attempting to prepare a new one for the trick. Insulation should be provided in the niches so that the wires do not short across the brass. Once these wires have been secured, the procedure is the same in that they are attached to a lamp cord. If the lamp is on the plate of glass, the fine wires should be run along the back rim of the

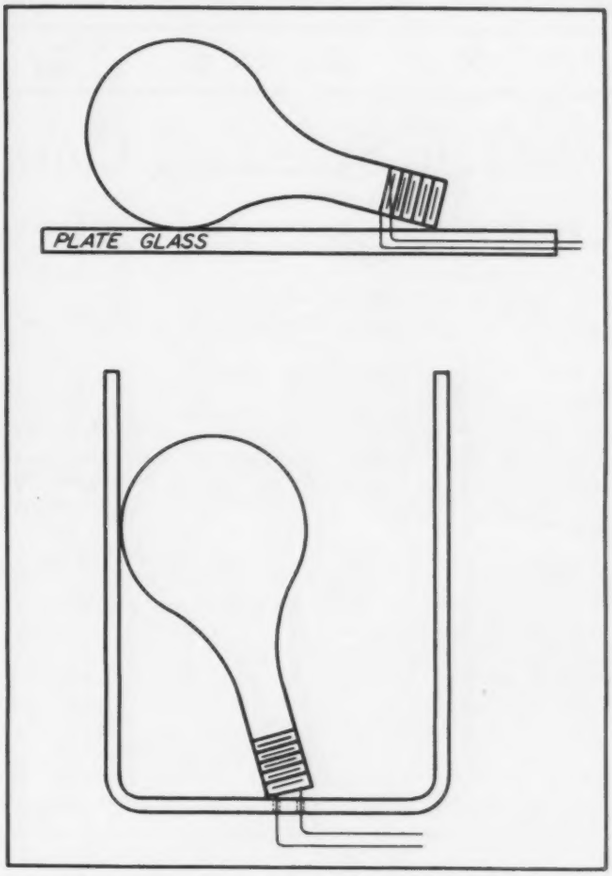
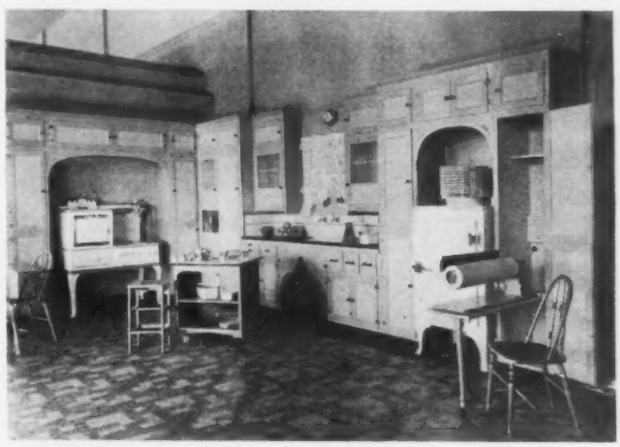


Diagram of connections for two variations of trick

plate, as indicated, and down one of the legs which support the plate. It may be best to paint this rim green or some other color so that there is less chance of the public seeing the wires. If the lamp in the tumbler is turned base up, the same wiring procedure can be used.

▼

It Doesn't Take a Mansion To Be a Model Home



IT DOESN'T take much space to house every electric kitchen appliance, as this model exhibit shows. Note the Easy ironer at the right, which can be folded up into the cupboard when not in use, like an old-fashioned ironing board. Many other appliances are also closeted in this manner.

Electric Sweating Cuts Orange Curing Costs

By W. R. CHAWNER
Commercial Engineer, The Southern Sierras Power Co.

IN ADDITION to the various physical advantages of sweating oranges electrically, figures have been released, thanks to Alec Barnes. manager of the American Fruit Growers packing plant at Corona, Calif., which prove that the electrical method offers financial savings also.

In a previous article on the subject (EWEST, June 1, 1932, p. 570), a comparison of fuel costs showed the electrical method to be slightly more expensive than those means employing oil at 3 or even 5 c. a gallon, and gas at 40 c. per 1,000 cu. ft. The previous figures, however, related to straight electrical heating of curing rooms, without circulation of air by means of fans; no attempt was made at humidification, or at least such efforts as were made were experimental. The cost per box for oil at 3 c. was shown to be 1.38 mills; with oil at 5 c., 2.30 mills; for gas at 40 c. per 1,000 cu. ft., the same; and for electricity at 1.6 c. per kw.-hr., 2.45 mills.

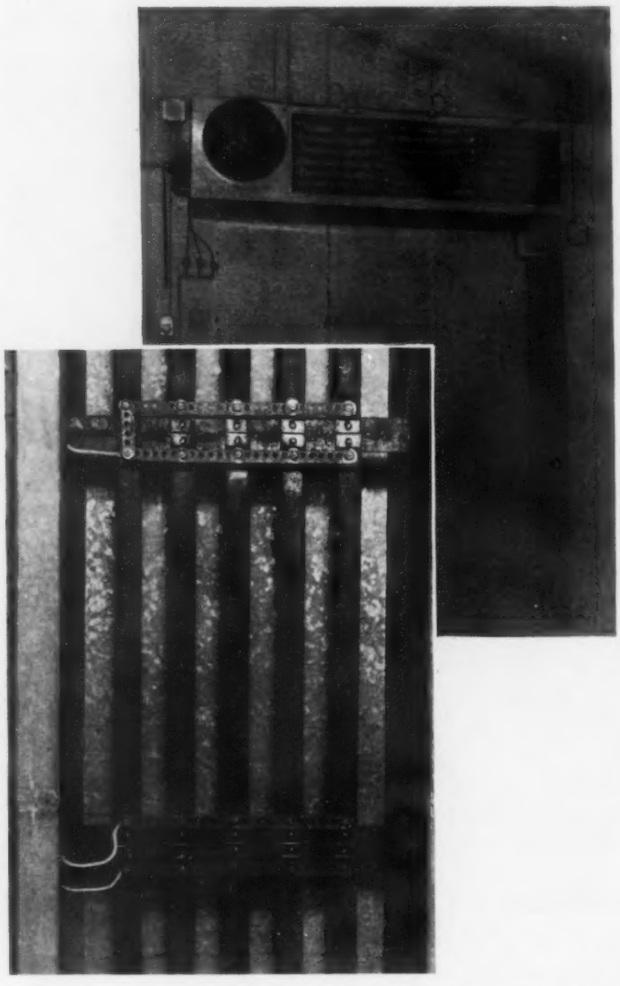
Use of the humidifying system as developed by Robert H. Mohler, of Pasadena, and illustrated here, however, has proved less costly in total costs of operation. From the period April 25 to June 2, 1932, 23,410 packed boxes of fruit were sweated, amounting to about 43,000 field boxes. The total consumption of electricity for heating and power for circulating the fans in the Mohler humidifying equipment was as follows:

April 22 to May 23.....	4,680 kw.-hr.	Cost $ 86.31
May 24 to June 15.....	1,240 kw.-hr.	Cost 27.07
Total.....	5,920 kw.-hr.	Cost $113.38

giving a cost of $0.00263 per field box and $0.00483 per packed box, with an average electric rate of 1.9 c. per kw.-hr.

This energy cost is higher, yet the savings made possible by the other advantages of the electrical method are sufficient to justify its use. Fire hazard is eliminated, which means a saving in labor of at least $1 per night or, say, $30 on the six-week's run. In sweat rooms, which do not maintain such a uniform high humidity as do the rooms referred to above, there is a considerable loss due to shrinkage of fruit; this loss is eliminated by the machine under discussion. Just how much, it is impossible to say since no comparative tests were made. There also is a saving in the time taken to sweat the fruit; while it represents a monetary saving, this is not easily expressed in dollars and cents.

Moreover, it is a fact well known to science that, to get the utmost efficiency from the coloring properties of ethylene gas, it should be in solution in water vapor. Since the machine gave a constant humidity of 90 per cent, only 1½ tanks of ethylene were used in the run, as against two tanks in a normal run. These tanks cost $16.80 each, so that the saving amounts to $8.40. The installed cost of these machines amounts to $1,500 for the 6 rooms. The oil-fired equipment at Orosi, which operated at the fuel cost of 1.38 mills, cost $3,000 for 5 rooms. Likewise, maintenance is higher with oil than with electrical equipment.



In the top photograph is the humidifying unit, showing the fan below which is the mercoid switch and valves to admit water to the three banks of humidifying compacts, revealed next to the fan with the cover removed. The heating elements as shown in detail in the lower photograph, are located in the shaft of the unit seen on the extreme right of the upper photograph. Note how strip heaters are bussed together

The humidifiers at Corona were installed by Mr. Mohler and the electrical installation was carried out by Hughes Electric Shop, of Corona. This included 15 strips of 500 watts each, or a total heat load of 7.5 kw., of which 5 kw. is controlled automatically and 2.5 kw. manually. Initially, all the heat load is thrown on; after 24 hours, 2.5 kw. is turned off and the room heat maintained by the thermostatically-controlled strips.

As stated before, all risk of fire is eliminated since the heat control is separated by a remote-control mercoid switch which can be seen in the left of the accompanying photograph. Constant air change is very beneficial in sweating, because it tends to prevent the formation of toxic quantities of carbon dioxide, which, if allowed to accumulate, cause general breakdown in the fruit. With the heat turned off, these sweat rooms give almost perfect conditions for the storage of lemons.

A Department for the Industrial Electrical Contractor — the Motor Specialist

MOTOR FORUM

An Exchange of Ideas on Economic Electrical, Mechanical and Business Problems

What Technology Does To Motor Repairing

And a Remedy Which Is Based on Co-operation Between Contractors in the Rural Communities Is Suggested

PERHAPS no other specialty has been affected by such rapid and radical changes in the past few years as the electric motor repair business. As the price of new motors declines steadily, the motor repair shop operator awakens to realize that the bare cost of rewinding often exceeds new motor prices.

A few years ago, motor rental business was almost the basis of existence. During the shortage of motors after the war, one of San Francisco's principal shops, with a large stock of used motors, refused to sell them even for the price new, preferring to establish a rental trade. Later, users discovered that new units could be purchased on time payments which were less than rental charges, so this business died.

The demand of users for low prices has been so complied with by manufacturers, and discounts so shaved, that profit to dealers on the sale of new motors is ridiculous; the only opportunity for fair profit on sales lies in the second-hand business. The dealer's attitude has come to be that, if a customer walks in and orders a new motor, well and good; if not, the discounts are too low to justify the time or expense involved in going out to make a sale.

Machinery manufacturers are granted discounts on new motors in excess of those given dealers and motor specialists, and are able to sell these machines, motor equipped, to the dealers' customers at a saving greater than the dealer discount. From the customers' point of view, this is progress in distribution, the elimination of one of the middle steps in the chain.

Motor manufacturers advocate standarization of equipment in an industrial plant to facilitate replacements. Stator changes obviate rewinds for fast service; modern squirrel-cage rotors seldom give trouble; use of protective devices and pushbutton starters have reduced burnouts to a minimum. The one saving a repair shop still offers in case of a burnout is where the dimensions are such that replacement involves considerable labor in revamping the mounting arrangement, but even this is doomed by a recent agreement among motor manufacturers that all makes will be of standarized dimensions and, so, interchangeable.

All of these aforementioned factors do not constitute a mere selfish policy on the part of mercenary manufacturers, as might appear. It is progress, to which the operator of a repair shop, injured by efficient motor production and economical operation, is forced to submit, even though laggingly and reluctantly. The aggressive manufacturer, on his toes, still must seek further improvements in his product and manufacturing methods.

This trend of change has swung many old, established shops, previously scorning wiring construction, into making that side of their businesses of chief interest. Mass production, refinements in manufacture and improved materials have been chiefly a boon to the wireman, but they have been the opposite to the repair shop industry.

What to Do About It?

Seeking a remedy, the problem presents more difficulties in the larger cities than in the country districts where small communities are closely associated. The existence of so many old established shops in large cities is not justified by the small total of available work. Whatever future possibilities do exist must come from changes in policies of management and of production of work. Perhaps the best example of the kind of organization that will be necessary to survive can be indicated in an actual case.

A man widely experienced as a motor and control repair specialist left the city to accept a position in the country. On arrival he learned that he was to take charge of a one-man winding shop for a contractor who sold fixtures, contracted wiring, sold appliances, sold and installed pumps, and did general repair work. From former experience the motor specialist sensed that the job could not be permanent; the contractor disagreed, offered top wages, and the motor man stayed.

Business was good then, but in a short time the motor man was spending much of his time repairing flat irons, selling lamps or a fuse over the counter. His helper, hired at his suggestion to strip motors and wind coils, acted as emergency delivery man, taking materials out on the wiring jobs. As was to be expected, in about a year the contractor was in bad financial shape. Contractor and motor specialist got together, brought in a silent partner and reorganized to promote a new plan. The motor department was purchased and reopened under a new name and location. Winding equipment was purchased or made. The contractor made contracting his exclusive specialty and the motor man handled the motor business.

In part, the policy of the new motor shop was as follows:

1. Sell for cash only, except to organized companies, corporations or municipalities that were first class pay.
2. Turn out high class workmanship only.
3. Inform the customer. Carry on all negotiations with him openly. Protect his interest and advise him as to equipment application and repairs.
4. Make 100 per cent of the dealers in the territory the principal customers.

In order to show that the results obtained were due more to the merit of the plan than to the motor specialist's business capabilities, it is necessary to insert here that he had had no previous business experience, was not of the salesman type, in fact was principally a first-class mechanic who knew his work thoroughly and was frank and honest.

Printed price lists, competitive with those of neighboring metropolitan cities, but plus transportation, were distributed. Contractors in all neighboring towns in a 75-mile radius were called upon. Since many of them had experienced difficulty in trying to handle motor repairs, they quickly grasped the advantages offered. A discount of 20 per cent from list, terms 10 days, 30 days net, provided the customers engaged in

no winding work themselves, was offered. In return, it was agreed that the motor shop would handle no appliances, fixtures or wiring. As the territory was a farming one, and collections difficult, the terms arrangement was emphasized since winding cost is chiefly labor. In most cases the smaller customers, such as farmers with pump motors or small industrials, could pay cash if absolutely necessary. However, if a dealer chose to carry them he could so so as long as he paid the motor shop as per the terms. The rule was adhered to strictly. This was important; otherwise the customer, asked for cash by the dealer, might have come direct to the motor shop. Instead, the opposite took place, protecting the dealer.

Early fear that dealers might sell under the list price because of the liberal discount did not materialize; the dealers soon realized that the discount represented real profit, even without handling the motors. In the past, sending a motor to a neighboring shop had meant sending it to a competitor. The motor shop was not a competitor, but a service organization. Formerly, no individual dealer had received enough winding work to handle it economically. Attempts to operate with a so-called combination man (a wireman who is supposed to be a motor specialist too, and usually is neither), were abandoned. Collectively, with all the work from surrounding towns centralized, a sufficient quantity of work was created to merit the use of production equipment and the employment of specialized help, resulting in a profit to all. The customer likewise received higher quality work and faster service.

Small armatures, from vacuum cleaners, drills, etc., were shipped to a specialist in the metropolis who offered good discounts. A variety of standard bearings were stocked and other dealers discontinued carrying the small incomplete stocks formerly carried in favor of buying from the motor shop with discounts as needed; the same was true of carbon brushes, pulleys and similar items.

Eventually, complete cooperation was attained among dealers, with the exception of one, who operated a one-man shop in conjunction with wiring and an electrical store. His business had been sought by the motor shop but refused. The class of work he turned out, contrary to his belief, was poor, and it was felt that poor work done in the town, no matter by whom, was a reflection upon all of the local shops and subject to criticism from neighboring town dealers. All attempts to convince him that he could only lose money were futile.

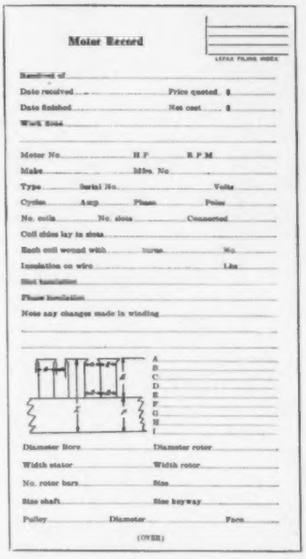
As every motor specialist knows, a large portion of motor types, especially in smaller single-phase classes, are so constructed and so low priced new that repair is uneconomical unless specialized under extensive mass production. This class of work was refused by the exclusive motor shop, which advised the customer to purchase new equipment. Such work often reverted to the competitor. Also customers refused credit by the cooperating dealers and the associated motor shop went to the competitor. Naturally, it was only a short time before the competition was self-eliminated.

The one claim made by the competitor that had merit was that, once a customer was sent with work to the motor shop, he would return there first with the next job. This factor at first jeojardized the harmony between dealers and the motor shop; the problem required diplomacy and many errors were made before the situation adjusted itself. In the end the dealers in the neighboring towns lost no clientele and the local dealers held their best customers after it once was understood by experience that price, service and quality were identical, no matter to whom the work was given.

At latest reports this shop had handled considerable big work and was still operating successfully under the same policy. If leading competitive mnufacturers have benefited by cooperating to the extent of standardizing dimensions, requiring costly changes in their production equipment, then a lesson in the importance and efficacy of intelligent cooperation along these lines can well be learned by the motor dealers and contractors.

▼

Complete Record Kept On Lefax Sheet


Motor Record

LEFAX FILING INDEX

Rewound at

Date received ..... Price quoted. $

Date finished ..... Net cost ..... $

Work done

Motor No. ..... H.P. ..... R.P.M.

Make ..... Mfrs. No.

Type ..... Serial No. ..... Volts

Cycles ..... Amp. ..... Phase ..... Poles

No. coils ..... No. slots ..... Connected

Coil sides lay in slots

Each coil wound with ..... turns ..... No.

Insulation on wire ..... Lbs.

Slot insulation

Phase insulation

Note any changes made in winding

A
B
C
D
E
F
G
H
I

Diameter Bore ..... Diameter rotor

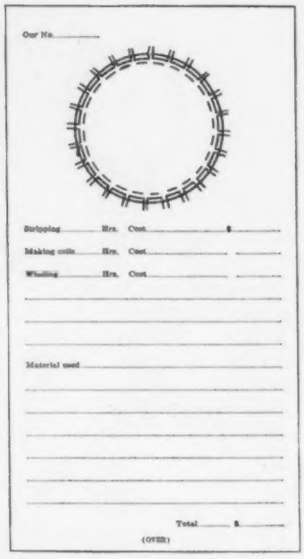
Width stator ..... Width rotor

No. rotor bars ..... Size

Size shaft ..... Size key way

Pulley ..... Diameter ..... Face

(OVER)


Our No.

Stripping ..... Hrs. Cost ..... $

Making coils ..... Hrs. Cost

Winding ..... Hrs. Cost

Material used

Total ..... $

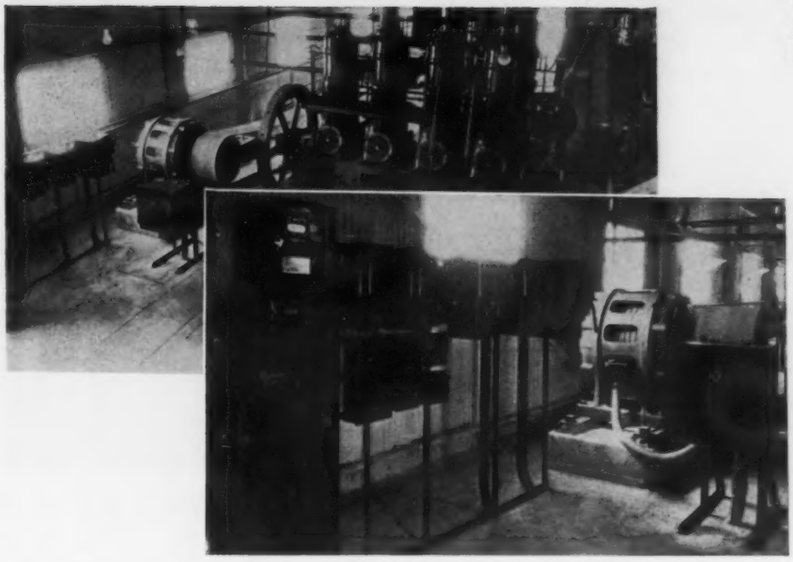
(OVER)

PHIL ROBBINS, of Santa Rosa, Calif., maintains the most orderly, the cleanest motor shop in the West, bar none. As a small shop it is surprisingly complete in its equipment, much of which Mr. Robbins has fashioned with craftsman skill, himself. Likewise, Mr. Robbins likes to keep a complete record of motors, upon which he does work, in handy form so that ready reference to the record may be had at all times. Some years ago, therefore, he drafted a record form, designed to go on two sides of a Lefax loose-leaf sheet, and had the Lefax company print these forms for him. Since then they have become a standard sheet with the publishers.

The record not only carries headings for all the electrical and mechanical data concerning the motor, but on its reverse side also carries a record of the work done on it, materials used and a space for totaling up the costs. Thus at once it is a reference record both of the characteristics of the machine and also of costs. By use of this form Mr. Robbins has been able to analyze his various labor costs and to improve winding and repair technique in many particulars. Often the record comes in very handy on a trouble call. It can be located quickly, slipped into the pocket binder Mr. Robbins carries with him and taken to the job. Thus it saves time in trouble shooting, even helps to prediagnose motor trouble before leaving the shop and so anticipate tools and materials needed for repair.

▼

Industrial Lighting Requirements — The United States Department of Labor has issued from its Women's Bureau a new bulletin, No. 94, treating exhaustively of state requirements for industrial lighting for the protection of women workers. It is a book that the industrial lighting salesman, industrial contractor, and equipment man may use with profit.



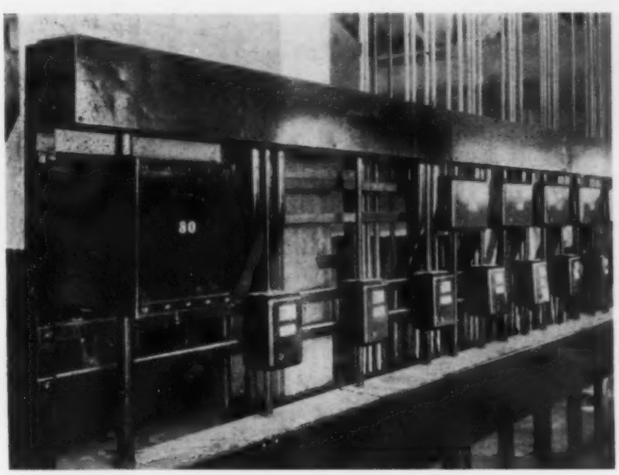
Motors Replace Diesels

PURE ICE Co., of El Centro, Calif., after several years of experience with diesel engines, recently shut down the engines and had Backstrand Bros., industrial electrical contractors of Riverside, Calif., install a 200-hp. and a 100-hp. motor to take the place of engines of the same ratings. The job necessitated a complete changeover, a switching center and distribution layout. The changeover was made with a total shutdown of only three hours, the motors and switching apparatus being all installed ready to take over the load. Reasons for abandoning the engines were given as constant supervision necessary, increasing maintenance with age and unreliability of service.

▼ ▼ ▼

Concentrated Distribution Center

FLEXIBLE, safe, accessible and neat appearing is this distribution center at Weyerhaeuser Timber Co., Longview, Wash. Between the enclosed bus gutters at the top and bottom of the angle-iron framework, full-voltage magnetic switches are installed, with reversing switches on the top row. Such concentration of individual starting equipment is becoming increasingly popular with industrial engineers, this particular design being favored because it combines reliability and easy maintenance with a relatively low first cost.



▼

Motor Training Course—What amounts almost to a text book on the operating characteristics of alternating current motors was prepared in mimeograph form by Thomas C. McFarland, associate professor of electrical engineering, University of California, for the rural electric short course given at the farm school at Davis, last November. The course was taken by a selected group of power company agricultural salesmen to train them better to sell agricultural power applications and advise farmers on the more efficient use of their power apparatus. Prof. McFarland's text is a model of simplicity and is without the usual mathematical appearance.

Water Jacket on Compressor Exhaust Furnishes Hot Water

INGENIOUS use of waste heat is made in the Jaite Co. paper bag plant built not long ago in Wilmington, Calif., and for which the electrical installation was made by Frank McGinley, pioneer Electragist of that city. A 25-hp. compressor is in use to provide compressed air for the manufacturing process and is driven by a 25-hp. motor which is automatically started and stopped by an automatic pressure switch on the tank. Around the compressor is a water jacket, such as are common to compressors, but instead of feeding to an outside cooling tower, this is connected to a large water tank. Thus, the operation of the compressor keeps the water hot and supplies all the hot water needed for the wash rooms and other uses; it even feeds radiators to keep the offices warm during chilly weather.

The electrical installation is interesting in that, rather than running the conduits to supply the printing presses and bag presses under the floor slab, they are run up from the distribution panels, as illustrated herewith, and along the roof trusses. Just above each machine, they are connected by rigid conduit to the motor or heater coil as required. This system makes for economy of installation, but, more than that, greater flexibility for future changes in location of machinery.

Controlling Cost by Thoughtful Planning

Because the Architects and Engineers on Spokane's Municipal Airport Depot Provided for Unusual Tenancy Requirements, No Extras Were in the Bill

By LADNER V. ROSS
Illuminating Engineer, The Washington Water Power Co.

Floodlights at the base of each pilaster give the depot an unusual appearance

IF ADEQUATE electrical capacity can be written into the specifications of a building before contracts are let, the cost is rarely out of line. It is the "extras" on an inadequate job that irk the owner—and naturally, too.

Any builder has the right to expect that the sum of the low bids by the different contractors will represent the ultimate cost in placing his property in a revenue-producing condition. It is only when architects and engineers themselves are convinced of the need for electrical adequacy, and provide for it in their original plans, that the owner is saved additional cost for wiring during the first few months of occupancy. These tenancy changes easily may run to a large percentage of the original electrical contract, if not exceeding it.

A building where this saving was made by providing adequacy in the original layout is the new municipal airport depot in Spokane. Located at Felts Field, it is a two-story, solid-concrete building, with a partial basement to provide for the heating plant with electrically-driven stoker, fuel room, electrical and telephone distribution, and storerooms. The main floor has a modest lobby and waiting room, ticket offices and lunch counter which uses electrical equipment to a large extent. Also on this floor are two washrooms, each equipped with circular lavatories with foot-control, electric hand-driers with foot-control and ventilating fans with automatic louvers.

On the second floor is the airways division of the U. S. Weather Bureau and some vacant space for offices, pilots' club room, etc. Anyone who has wired a building to be occupied by a Weather Bureau office knows the large number and variety of electrical and conduit requirements and can imagine the difficulties of providing such wiring in a concrete building after construction has been completed. Due to the foresight of the engineers designing this building, complete information as to the electrical and conduit requirements were obtained and included in the electrical specifications before bids were called for. As a result, there is not one exposed wire in the offices today.

The roof has a small penthouse with private stairway, for Weather Bureau equipment, remote control switches for aviation ceiling light and for field landing lights. Also on the roof are obstruction lights, code-flashing beacon, weatherproof convenience outlets and two 1-in. empty conduits running from different parts of the roof to the electrical distribution center in the basement. These are intended for special radio broadcast, for telegraph wires or unusual lighting requirements in cases of special air events. The code-flashing beacon and obstruction lights are operated simultaneously with the field marker lights by means of a series-multiple relay; field lights are controlled by a time clock with astronomical dial. A section of the series cable is brought into the building and, through a relay which closes the multiple circuit, fed off of the building panel whenever the field lights are on.

All electrical and telephone service to the building is underground, from pole lines about 200 feet away. The distribution center in the basement includes a 200-amp. safety switch, meter loop, 44-circuit distribution panel with split bus (the bottom eight circuits supplying floodlighting), a magnetic switch controlling the feeders to the bottom portion of the panel, a series-multiple relay controlling the code-flashing beacon and obstruction lights, and a timer for the beacon. Spare branch circuits are provided on the panel for every five active circuits. Ample convenience outlets are located throughout the building, a total of 30. Convenience outlets are not connected to circuits used for general lighting. Branch circuits are limited to 1,000 watts each, based on the wattages marked beside each outlet shown on the plans. Convenience outlets, all duplex except those on roof, which are mounted in weatherproof condulets with spring hinged covers, are limited to six per circuit. Ceiling outlets in offices and lobby are limited to two per circuit. All wire used has 30 per cent para rubber insulation, minimum size No. 12, for lights or power. Flush tumbler switches are a type especially designed for operation of Type "C" Mazda lamps.

An unusual feature in a building of this size is the complete conduit system for telephones; two or more telephone outlets are provided for every office space in the building, while junction boxes are located at an accessible point on each floor and a main distribution panel in the basement near the electrical distribution.

Probably the crowning glory of the building, to the casual spectator, is the unusual floodlighting treatment of the exterior. A 500-watt enclosed floodlight is bracketed to the building near the ground at the bottom of each pilaster. Inside control rings protect the eyes of passersby from glare, and emphasize the vertical lines of the building by cutting out all spill light. Horizontal projecting ledges, suggestive of column capitals, were added after the exterior lighting had been planned; while these projections prevent an unbroken streak of light to the top of the building, the result is not at all unpleasing, probably because of the perfect symmetry of the lighted effect. Projectors on each side of the main entrances were placed in the same relation to the pilasters as the others by providing recesses in the step buttresses flanking the doorways. Flush grates

slipped in over these projectors protect the floodlights and spectators from injury.

All interior lighting equipment is Graybar direct lighting white enclosing globes on chain hangers; the outside floodlighting is done with Curtis "X-Ray" projectors; while the aviation obstruction lights and code-flashing beacon are Westinghouse.

The building was designed by Benjamin J. Garnett, engineer in the Spokane City Engineer's office, while Rigg & Vantyne, architects, were associated with him in the architectural treatment of the building. Tinling & Powell, Spokane, were the electrical contractors.

▼

Control Takes Cost Fear From Lighting

Facilities to Exercise Economy as Well as to Provide Adequate or Artistic Lighting Are Desired by Proprietors

BRUCKNER'S in Fresno, is a women's wear shop. It is located in a none-too-ample store and basement along the Kern Street front of the Californian Hotel. These facts are important only as they establish the size of the store as approximately 75 ft. frontage on Kern Street, and about 35 ft. depth; the entire frontage is in windows. How to provide a salon for the display and modeling of gowns, without sacrificing window frontage and daylight, was a problem Mr. Bruckner pondered over. He was anxious to remodel his facilities in trend with the new modes of dress, better to sell the new gowns, of course. The previous arrangement was crowded, did not set off the gowns well, was too much like a corner devoted to gowns in a store which otherwise appeared chiefly concerned with hosiery, underwear and counter goods.

Remembering that Carl Wolf, electrical engineer for the Valley Electrical Supply Co., had helped him solve another window lighting problem when he first occupied the store, Mr. Bruckner consulted him. Mr. Wolf, perhaps it had best be put, anticipated the call; at any rate the two talked things over. As a result, designer J. C. Rennie-Bartle was called in and a plan evolved: The rear portion of the frontage, with a 24-ft. window, would be the salon. At night, with drapes drawn, it would become a show window; by day with light drapes pulled across, a suggestion of the salon would be visible from the street, daylight would contribute to the interior cheeriness, and artificial light, used at night for the window-lighting effect, would become a part of the decorative scheme of the moderne interior.

As seen from the street, the salon at night becomes a show window when the drapes are drawn aside

Spaciousness would be given by the large window and by two large fitting mirrors whose lines would be amplified by the placing of a light box above and down one side of the mirror and of the doorway exactly opposite it. A fluted, stainless steel pillar alongside the mirror would reflect light and enhance the width of the mirror and of the entrance doorway.

Along the tops of the stock cases and the fitting rooms at the rear, making up the side walls of the room, a continuous lighted strip would be run. German flashed glass, bordered by shining metal strips and crossed by double metal fins, would be used. The lighting inside these strips was to be provided by two circuits of lamps, separately switched so that half or all might be operated at a time. The sheet metal interior of the strips was left unpainted, better to break up the bright lamp spots and diffuse the light flux while reflecting it to the glass face of the panel. The lamps,

If it appears, in this and succeeding issues, that ELECTRICAL WEST devotes too much space to the work of one engineer, it is simply because this engineer is possessed of more than the average imagination, trained likewise as an architect, and maintains so much the customer's viewpoint that he has no difficulty in selling the latter what to others often appears to be a super installation. That the customer never feels so—rather feels that his personal requirements have been anticipated for once— and usually is enthusiastic about his electrical facilities, is not magic either. Nor is it high pressure salesmanship. It is simply that his own interests, electrically, have been shown to him and provided for him. The purpose of these articles is that others may pattern their own sales appeal from such successful examples, and profit likewise. And speaking of profit, Mr. Wolf always has sold his clients on paying much more for the electrical installation than the contractors have bid or have charged to perform the work. A striking feature of these articles, lest it escape notice, is that, in the San Joaquin Valley, the depression has been on for ten years; that agricultural conditions, population growth and business growth all have been at a standstill. New construction has been very limited. Because of these facts, electric load growth, electrification, has had to come from existing customers. Modernization is not a new program, but has been a consistent one in this region. To the world at large, just now facing a similar necessity, the experience, the technique of the resourceful, creative Valley Electrical Supply Co., engineer, represents valuable pioneer work and an inspiration to do likewise.

Detail of the fitting corner, showing at right a lighted display niche, with its stainless-steel fluted backing; the vestibule leading to the three fitting rooms, with the directional plate above the entrance to direct light upon the woman standing upon the hardwood floor triangle in front of the mirror. An illuminated dial electric clock tops the mirror

too, were mounted below the glass facing and the light totally reflected to the glass from within the strip trough.

Lighted niches break the plain surface of the walls. These niches are backed by the same metal fluting and are lighted above from a soffit panel, below from a similar panel, or on the floor from a lighted base. Spotlights, mounted high above the window, may be directed to particular pieces of merchandise left at night anywhere on the salon floor.

The arrangement of three fitting rooms and of the main fitting mirror is ingenious. Three fitting rooms are grouped—one at the back of the mirror, another in the corner of the room, and the third at the right hand of the mirror—on a checkerboard squaring, with a common wall between them. Entrance is provided by a little vestibule formed of the three doors which cut off the corner of each fitting room at the common corner. Above this vestibule the lighting strip is carried back as a lighted ceiling panel. Inside the fitting rooms the lighting is provided by means of a ceiling panel; thus, nowhere in the salon is there a bare lamp visible. The fitting rooms are ventilated by means of a duct which exhausts through a grille in the ceilings.

"I wish that it were possible to show a gown both on a dance floor and in a carpeted room," thought Mr. Bruckner, aloud. "But you can," answered Mr. Wolf, and he provided a triangle of hardwood floor in front of the main mirror, which, through reflection in the glass, became a square of hardwood polished floor. To bring more light upon milady as she gazed upon herself begowned before the mirror, two Holophane directional plates were mounted in the lighting strip, one above the entrance to the vestibule, the other over the stock room door opposite. Light from these is directed upon whoever or whatever is standing before the mirror. A heavy, richly-colored rug covers the entire floor, and the furnishings in keeping are modernistic polished steel and cushions.

The finished result is surprisingly effective. Women feel delighted by the neutrality of the background and the manner in which it concentrates all attention upon the gown and themselves. The decoration is so simple that the gown and wearer leap into prominence. After all, this is just exactly the reaction that the merchant most desires.

An electrical feature of the installation is that the lighting may be so conveniently handled by the proprietor. Inside the door of the stock room is a metal trough in which are mounted a number of switches. By these, the proprietor presets the sections of strip that he wants lighted (such as just around the mirrors), the niches to be lighted and the degree of intensity. The actual operation then is started at the entrance doorway by a pushbutton operating a contactor. Thus, during the day, no lighting may be used until a customer is being taken to the salon. A touch of the button at the entrance lights the room to the daytime intensities previously set up. At night, gowns are brought forth upon stands or racks, furniture arranged, front drapes drawn, and another intensity or arrangement of lighting set up. The watchman on his window-lighting rounds, by means of a key socket on the exterior, remotely shuts off the electricity late at night.

"I have never found any complaint as to cost of lighting or of electricity as long as we provide the customer with the means to use as little or as much as he decides himself," says Mr. Wolf. Therefore he always provides convenient means of control, thought out, as in this case, from the viewpoint of convenience and adaptability to the user and his needs. In this case the lighting load is 8 kw.; and yet, because of this convenience in control of use, the proprietor of the establishment feels it is his own responsibility to use it all or not according to his business needs.

The electrical contractor, Inland Light Co., at first interested in the job as a fixture prospect, found in it not merely the hanging of the usual four fixtures, but a high-class wiring job much beyond expectations. It even involved a concealed radio set.

▼

No Wind Can Blow Out This Picnic Fire

PICNICKERS at the South Venice (Calif.) beach now rent electric hotplates for cooking just as they rent bathing suits and umbrellas, for the Los Angeles Playground Department, acting on the recommendations of

E. G. Alberts, of the Bureau of Power & Light, and David Berniker, supervisor of construction and maintenance for the playground department, has electrically-equipped the picnic area.

This area, glass-enclosed and large enough for 1,000 persons, is equipped with tables and benches, but no provision previously had been made for the cooking of foods. So a kitchen was installed with cooking utensils, a 5-kw. water heater, a 4-kw. broiler and four 3-kw. hotplates. In addition, eight 2-kw. hotplates were placed outside, adjacent to the picnic tables, making a total connected load of 37 kw. These hotplates were made in the playground department's shops with Chromalox units and installed by department electricians. An automatic time switch and prepayment meter, similar to those used for the sale of refrigerators and for controlling tennis court lights, is mounted on each plate and turns on electricity for 20 minutes when a dime is deposited. Thus, the rental pays for the electricity used both in cooking and in heating water, and a bit toward the retirement of the investment.

Electricity was used because of its cleanliness, convenience and safety; pots and pans remain clean and the wind cannot blow the flame out. Other picnic grounds and resorts could profit by this example, inasmuch as the investment is returned and the equipment adds a great deal to the enjoyment of an outing.

▼

Composer Builds Real Red Seal Playhouse

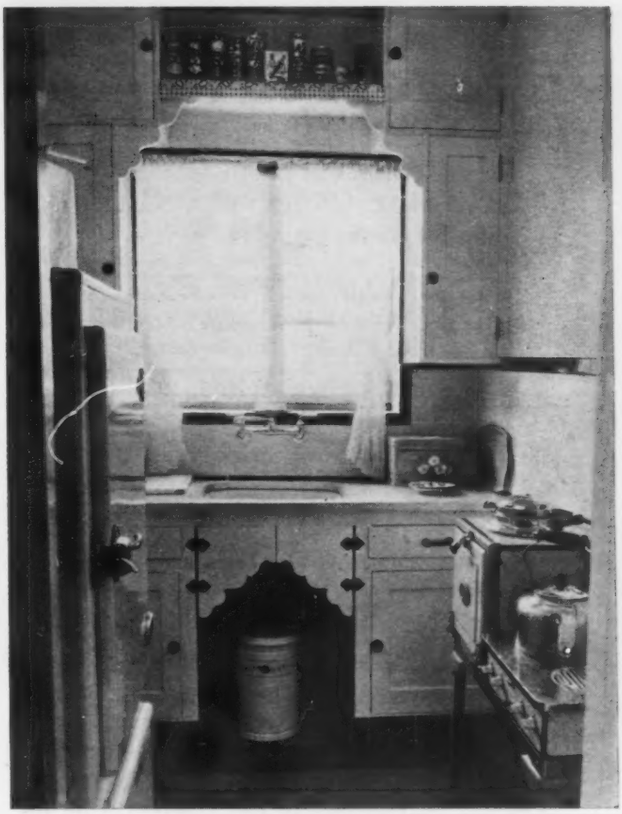
VICTOR Schertzinger, best known for his musical compositions and his direction of moving pictures, knows the full convenience of electricity in his beautiful Los Angeles home. But that isn't all. The new generation of Schertzingers, his two little daughters, Paula and Patty, are going to know it too. He has just built them a pretty little three-room playhouse below the formal garden of his home, and it is a Red Seal house in every particular, even to the electric range.

The house is complete in all details, only in miniature. The living room has a small-size electric grandfather clock, small floor lamps, small bracket and ceiling lighting fixtures.

The kitchen is the gem of the house: just big enough for two girls, it has a small sink, with cupboards, filled with small packages of real food. A small refrigerator is on one side and a 2½-kw. Guilbert range, a real range in every respect, is on the other side.

Heating is provided electrically, too. The fireplace is fitted with a 2-kw. heater and the bathroom has an outlet as provided in Red Seal specifications, for a portable heater. Diminutive bathroom fixtures are in keeping with the entire scheme.

Like the gingerbread house of fairy story lore is this little Red Seal playhouse



Kitchen in miniature, with refrigerator, range and appliances

Proud as punch of the Red Seal job is Herbert L. Evans, superintendent for the Nicholas Electric Co., which made the installation. Proud, too, is Mr. Schertzinger, and Mrs. Shertzinger is happy because the girls can cook with perfect safety, even away from watchful parental eyes. The whole family, in fact, likes the playhouse so well that it is quite popular at all times.

▼

HOME BUILDING BOOKS—Two final volumes prepared by President Hoover's Conference on Home Building and Home Ownership have just been released from Washington. Volume IV, "Home Ownership, Income and Types of Dwellings," and Volume XI, "Housing Objectives and Programs," complete the work of the committee, of which Dr. James Ford, Room 6857, New Commerce Building, Washington, is secretary. The first volume deals with the factors which make for healthy community home building. The second is a more imagination-stimulating work, in that it projects into the future the type of building which will be evolved and which already is in experimental development: the ready factory-built sectional houses which can be assembled quickly at the site. How this will affect the electrical contractor and the electrical supply jobber and even the utility is suggested in the trends in construction methods observed.

▼

AND THEN—there is the True Story of the Plumber and the Electrical Contractor who shared the same store, and the plumber paid the contractor's bills and earned the cash discounts for himself and the electrical man finally paid the plumber.

Electrical West

With Which Is Consolidated the "Journal of Electricity"
Established 1887

Published Monthly by
McGRAW-HILL COMPANY OF CALIFORNIA
883 Mission Street, San Francisco

Subscription: $2 a year, U. S. A. and possessions; Canada, $2.50; all other countries, $3 gold.
Member Audit Bureau of Circulations

Editor, George C. Tenney *Associate Editor*, W. A. Cyr
Associate Editor, C. W. Leihy *Assistant Editor*, R. H. Flynn

San Francisco, April 1, 1933

The Zero Hour For Business

MORALE: Conditions as affected by, or dependent upon, such moral or mental factors as zeal, spirit, hope, courage, confidence.—*Webster.*

COMMANDERS knew the value of it in the Great War. The immortal Light Brigade had it at the battle of Balaklava. It inspired a loyal band of Americans at Lexington in 1775. The electrical industry needs it today.

Enthusiasm and loyalty are threatened by inertia, apathy and fear. Material progress seems stultified. The mathematical verities in business, in finance, in engineering, are lost in a maze of moratoria, drastic retrenchment, unemployment and stagnation. Faith in the future has been shaken.

Yet the tangible and intangible assets back of the electrical industry are as firm and secure as ever. At this critical period it seems apropos to draw upon some of those rudimentary qualities which inspired the builders of this industry. To revive again those forgotten and almost outlawed words—hope, faith, vision, courage and spirit. To define once more cooperation.

Without spirit and zeal there is no investment in human energy; without hope and courage, no drive toward a goal; without faith no stability; without vision no future; without cooperation no peace in the electrical family. For cooperation isn't just a word; it's a feeling of warmth and helpfulness toward others in the same game. Vision is not seeing, but an imaginative looking and planning ahead. Faith is not an exhortation; it is a deep-seated sense of sureness, a belief in and a loyalty to the people in the industry and their ability. Hope is not a term; it is a state of aspiration for better things. Courage is not merely an academic challenge; it is the exultation that overcomes fear, that banishes apprehension and doubt. Zeal is not alone eagerness; it is a passionate devotion to a cause. Finally, confidence is a compound, not of the words, but of the human emotions implied by all of these simple terms together.

Even the worst skeptics admit that America has hit bottom; that from here the upward drive will start. This, then, is the zero hour, the time to draw deeply upon morale, to rally the human spirit that never admits defeat. Entering this new era inspired with courage, faith and the will to do, the electrical industry will find itself among the leaders in the stirring days to come.

An Open Letter To the President

TO FRANKLIN D. ROOSEVELT, President of the United States of America: Events of the last four weeks must give you a deep sense of personal gratification. The changed sentiment of business and of people generally—from despair to confidence—, the good nature and forbearance with which the nation took the banking holiday and the spectacular fashion in which Congress is acceding to your leadership, are encouraging signs for the future.

Unquestionably, Mr. President, you are anxious that this definite progress shall not be interrupted or impeded; so, too, is every fair-minded and right-thinking citizen. Has it occurred to you, as it has to some of us, that you have at your command a simple means of assuring its continuation? Electricity, through the medium of the radio, can do this for you.

In your inaugural address, and again on the evening of March 12, when you discussed the national banking crisis, we thought we sensed your peculiar aptitude for bringing to the people your personality, your hopes and your ideals through the medium of your voice. In millions of homes throughout the nation, on those two occasions, it must have seemed as though you were not a party leader, not an imaginary, distant personage, but a friendly human being sitting as a guest at the fireside, discussing problems of vital importance to every citizen in the land—discussing these problems by right of the authority granted you by the majority of the voters.

We realize full well that the Presidency has come to be almost synonymous with precedent, and that any action you might make is certain to be interpreted in the light of the actions of your predecessors. But you already have shown that, when the need of the country is dire and the well-being and confidence of the people are at stake, you are willing to sweep precedents aside in the performance of your work. No matter how efficient

and prophylactic the legislation you offer, no matter how soon the return to normalcy or better will have been made, the American public throughout the years of your administration will be in need of the inspiration which you alone can offer. We say that a national emergency always is present; even during more prosperous times, the attitude of the people, brought about through lack of interest in and understanding of the work of the government, should have alarmed the national leaders into using some medium to change it. Radio, it seems, has offered that medium.

We urge that you consider the opportunity which the radio offers to take the people into your confidence, to talk honest talk to plain citizens, to give an accounting of your stewardship, to bring the country first-hand information of the affairs of the nation as viewed by you, the leader. Do it once a week or once a month or whenever you have a message of national moment; only, do it often enough so that you will not lose the ground you have thus far gained.

There is an unwritten rule that trade or technical papers should not indulge in politics, so please do not construe this as a political document. It is merely an appeal to you to act in the public interest.

Electric Utilities Can Take It

SUPREME test of utility service is its ability to withstand calamity and disaster. When a tremendous shift in the surface of the earth rocked part of southern California late in the afternoon of March 10, the electric utilities met the situation with efficiency, dispatch and initiative. In Los Angeles proper there was a momentary blackness as a falling 220-kv. bus rack at an Edison substation upset system stability. After that electric supply was normal.

In Long Beach, center of the quake area, service was restored to the business district in four and a half minutes, all primary feeders were hot within an hour and a half. With communication lines down, dispatchers only were able to tell that Long Beach steam plant was uninjured by its ability to pick up load as required by the emergency. Interconnections functioned, and Los Angeles Gas and Electric Corporation took 10,000 kw. from Southern Sierras when the Seal Beach station was damaged. A program of emergency operation and organization devised by the Edison district superintendent in Long Beach, "just in case," worked perfectly.

Then, as conditions became known in the stricken areas, tents, cots, blankets and other construction equipment were turned over to relief agencies. Gas service in Long Beach was cut off; immediately, 200 electric ranges were made available to hospitals, the Red Cross and others for food preparation.

Employees forgot food and sleep. Operators sat at switchboards in temporary quarters, outwardly cool and courteous, inwardly fearful that the next of the almost hourly quakes would be worse than the first. Line crews, unmindful of lack of rest, cleared trouble and restored service to buildings and homes, erected temporary lines to serve relief camps.

Damage to utility systems was nominal, demonstrating once more the necessity for high caliber engineering and high class construction typical of utility practice. On the other hand, damage to certain classes of buildings generally presented a severe indictment of architects, builders and others responsible for the cheap and shoddy construction employed. As a result, strict building codes involving earthquake proof construction will be enacted in those communities definitely known to be located in earthquake regions.

Events of March 10 and the subsequent days in southern California prove one thing: In the parlance of the sports world, electric utilities can take it. We are proud to be a part of an industry that can rally so signally under emergency and disaster, even if it is only to report what happened.

The Directory In This Issue

"WHO handles Blank wire?" "Where can we get service parts for XYZ appliances?" For many years ELECTRICAL WEST has answered thousands of such questions from card index files of electrical manufacturers and their Western distributors. This service was limited in scope, however, since these files were only maintained in San Francisco. Believing that this information would be inestimably valuable to all of its readers, ELECTRICAL WEST publishes in this issue a "Where to Buy It in the West" directory listing electrical manufacturers with their branch offices or agents in the Pacific Coast states.

To make this new service as valuable as possible to the readers is the ambition of the editors. At present, plans call for the publication of this directory at least twice each year. It will be revised and enlarged. In the meantime the editors will welcome comments and criticisms.

Electric Utilities in Southern California Suffer Little Damage From Quake

ELECTRIC utilities serving the Southern California areas which were shaken most severely in the earthquake on Mar. 10, went through the disaster with a minimum of damage to their properties and proved their ability to maintain service under extreme emergency conditions.

Southern California Edison Co., Los Angeles Gas and Electric Corp. and Los Angeles Bureau of Power & Light serve the affected areas. The Edison company serves Long Beach, Compton, Watts, Huntington Park, Huntington Beach, Santa Ana and other Los Angeles and Orange County communities which bore the brunt of the quake. Service of the Los Angeles Gas and Electric Corp. and the Los Angeles Bureau of Power & Light is confined to Los Angeles, where the shocks were strong but the total of damage relatively small.

Damage to the properties of the three electric utilities probably will not exceed $250,000 when all surveys and estimates of loss have been completed. The comparative insignificance of this loss is apparent in view of the total investment of approximately $235,500,000 of the three companies in the affected areas. The amount of damage suffered by the Edison company first was estimated at $150,000 and probably will total somewhat less than that, according to Fred B. Lewis, vice-president and general manager. The company's investment in the sections of its territory which felt the effect of the quake is $100,000,000. The Edison Long Beach steam-electric generating station on Terminal Island was unaffected by the quake; the turbine in service at the time of the shock continued to operate and a second turbine was quickly brought into service to meet additional load requirements. Electric service, briefly interrupted in the communities involved because lines were down, was restored quickly. In Long Beach, virtually all city circuits were working after an interruption of 4½ minutes; in Compton, service was restored in 47 minutes.

A relatively small amount of the damage to Edison property was to buildings, most of the loss being in connection with the damaging of outdoor equipment, such as switch racks, transformers, loss of oil and damage to batteries. The only damage to the Long Beach steam station was outside of the steel and concrete buildings, and totaled approximately $25,000. The greater part of the damage here, as at Lighthipe substation, was to the 220-kv., bus structures, which went down.

Commercial offices at Long Beach, Compton, Santa Ana and Huntington Park were damaged, as were the storerooms at Compton and Santa Ana. The Compton and Long Beach office buildings are rented.

None of the large number of Edison employes in the affected areas, either on or off duty, were injured in the quake, and no fatalities or injuries to other persons were due to broken electrical lines or services.

The Los Angeles Gas and Electric Corporation loss, as far as now determined, is between $75,000 and $100,000. Virtually all of the major damage suffered by the corporation, which has an investment of approximately $48,000,000 in the electrical side of its business, was done at the Seal Beach steam generating plant. Seal Beach was one of the Orange County communities hard hit by the quake. Principal damage to the station was to walls of the building and to one generator unit. The building is of steel frame construction, with hollow tile and brick walls; the foundations are on piling driven into hard clay. In addition to wall breakage, a part of the structure foundation apparently settled, probably springing the generator shaft, with consequent damage to turbine blades and generator spindle. It was estimated on March 16 that this equipment would be restored to service in about three weeks.

This station ordinarily carries virtually all of the Los Angeles Gas and Electric Corporation's electrical load, and this was the case at the time of the quake. Because of the fact that, at the corporation's Alameda Street plant, a part of the equipment was down for overhaul, it was necessary for a time to drop a part of the load carried on some of the outlying circuits. By noon on Saturday, the day following the quake, the corporation had completed connections with the Southern Sierras Power Co., at San Bernardino, and continued to carry its load.

Los Angeles Bureau of Power and Light reported insignificant damage, probably not exceeding $2,000. There was slight damage to a penstock at the San Fernando hydro-electric plant, some lines broken in the Los Angeles Harbor area and approximately 3,000 out of 88,000 street lamp globes were broken. No estimate had been made of the loss in street lamp glass breakage. The Bureau of Power and Light investment, including its power plants which are located in sections where the earthquake shocks were of lesser severity, is approximately $87,500,000.

▼ ▼ ▼

Utilities Perform Outstanding Relief Service

PERFORMING outstanding emergency relief service, electrical cooking and heating equipment provided indispensable hot food and comfort for thousands of persons whose homes in Long Beach, Compton and other southern California communities were damaged in the earthquake. Relief camps established by the Red Cross, Salvation Army, American Legion, Catholic Welfare Association and other agencies; hospitals and first aid stations and temporary homes in tents and garages utilized electrical equipment extensively to meet the extraordinary requirements that came with the disaster.

Because of the necessary shutting off of the Long Beach municipal gas supply, due to the fire hazard, one of the first needs of the shaken city was for cooking equipment. Electric ranges already in service in homes and institutions went on community duty. More than 100 Edison company employes living in the city threw open their homes, with their electric ranges, for the use of distressed neighbors.

Truck loads of electric ranges from Edison company warehouses moved quickly into Long Beach and Compton and installations were being made by six gangs of Edison service men with

the coming of daylight after the quakes. Supplies of hotplates, air heaters, heating pads and other appliances moved almost continuously into the damaged towns. Stocks of many appliances, particularly hotplates and small air heaters, were quickly exhausted in Los Angeles and neighboring towns and supplies were replenished from San Francisco, San Diego and Phoenix, Ariz., warehouses. Approximately 100 electric ranges had been installed seventy-two hours after the quake.

The Edison company, moving with the dispatch that characterized the relief efforts of many other large organizations, sent other supplies into the shaken areas for the relief of the homeless. Tents and a rolling kitchen, used by the company in its construction camps, were sent to Long Beach and Compton for the use of the Red Cross, the American Legion and other organized agencies. This equipment had been in storage at the Edison general store at Alhambra, and was available without delay. Immediately after the quake, the Bureau of Power & Light sent twelve trucks with drivers into Long Beach, to operate under the direction of army officers. Included in the equipment was a 10-ton water tank truck which continuously hauled fresh water to the stricken area, working, as did the other trucks which hauled supplies, on a 24-hour schedule.

Responding splendidly to the demands of the emergency, employees of the Edison company worked tirelessly to provide the facilities of electrical cooking and heating equipment in the distressed communities. Many fine instances of service were recorded. There were numerous employees who, disregarding for the moment the damages to their own homes, carried on with company service to their communities.

Utilizing a railway freight depot, the Red Cross established a kitchen to serve patients quartered in a Pullman train hospital on an adjoining side track. It was in this depot that the first of the electric ranges sent in for emergency relief were installed. Electric ranges and water heaters were installed by the Edison forces for the Long Beach Community Hospital, which, with the Seaside Hospital, was one of the principal first aid centers. The Seaside Hospital installed all-electric kitchen equipment some months ago.

In addition to its other relief activities, the American Legion opened an emergency food center, providing hot meals from an electric range installed in the kitchen of the Legion's building there. Ranges also were installed at three centers speedily opened under the supervision of Catholic welfare units. One was put in service at the Catholic hospital, another at a public soup kitchen opened in a warehouse, and a third in the home of a priest.

Taking care of hundreds of homeless in a tent city established on the lawns of Bixby Park, Long Beach, the Salvation Army utilized electric cooking

Medical centers used electric ranges to sterilize water and instruments. Hastily-constructed wiring facilities may be seen

equipment as well as rolling kitchens supplied by military units in the southern California area. Batteries of electric cooker pots in tent kitchens were kept in constant use throughout many days. Here, as well as at other food centers, hot meals were provided in plentiful quantity to all who asked for food.

The Long Beach Elks' Club, the Y. W. C. A., the health department office in the city hall, and several clinics, their buildings unharmed or only slightly damaged in the quakes, utilized new electric range installations for the preparation of meals and for keeping water hot for sterilizing instruments and other medical and surgical needs.

Electric range installations were made in many strange places, according to service men of the Edison company who continued at this work from soon after the first shocks had ceased. Tents on lawns and in vacant lots, undamaged garages adjoining houses that were shaken badly, warehouses and office rooms were speedily transformed into kitchens. Numerous residents who ordered ranges for their own use opened their kitchens for the use of neighbors, sharing their equipment throughout the trying emergency period.

Electrical Business Booms

With damage variously estimated at from $45 to $60 millions, reconstruction in the earthquake areas will bring a decided improvement in southern California's unemployment situation and will boom the building and contracting industries there. Although not all of the razed buildings will be rebuilt immediately, much of the reconstruction work already has started and a large portion is in the offing.

In some of the cities, such as Compton, the entire business section will have to be rebuilt, probably under much more exacting ordinances than heretofore. Damage to schools, some of which have been totally condemned, will necessitate a building program of approximately $10 millions. Many of the homes in the section have been wrecked; not all of the home owners, however, are financially able to rebuild or repair, and donations from other cities and states and loans from Reconstruction Finance Corp. will be bent toward this purpose.

Just how much of the millions to be spent in reconstruction will be given to electrical contractors is difficult to guess; it is certain that large quantities of domestic, commercial and industrial wiring supplies will be required and that the electrical contractors in southern California will be busy for months. Fixtures and lamps will be needed by the hundreds of thousands; electric appliances must be replaced. Whether the fact that all cooking is being done by electricity, whether on ranges, flatirons or air heaters, or in cooker pots, will have any effect upon the future of electric cookery in the area is not even debatable. Thousands of gas users, now forced to a community electric range, will for the first time realize the advantages of the appliance.

Already appliance stocks have been drained from Los Angeles, San Francisco, San Diego and Phoenix; two carloads of insulators have been ordered by the utilities for replacements; replenishment stocks are being ordered by wholesalers and distributors.

▼

Bone Power Bill Signed By Governor

The Bone power bill, allowing Washington municipalities to sell power to districts beyond their corporate limits (EWEST, March, p. 105), has become a law with the signature of Gov. Clarence D. Martin. No changes were made by the house in the bill as passed by the state senate and previously reported.

Municipal utilities were saved from a heavy tax burden when the senate killed the Gray-Heffron bill, passed by the house, calling for a tax of 1.25 per cent on gross receipts of all municipal utilities (except water departments) within the city, and a 5 per cent tax on operations outside city limits. The purpose of the bill was to place municipal utilities on a parity with those privately owned.

Claiming that it will permit the state to undertake the Grand Coulee dam power project, a group has introduced in the senate a constitutional amendment to make the state a giant power district and providing that the state retain in perpetuity control of all water power development and power sites, organize a state hydroelectric commission and develop power separately or in conjunction with other states or the United States. Thus, the amendment is similar to that previously passed in Oregon. As a companion measure, a bill has been offered creating a board of state officials composed of the governor, state treasurer and director of conservation and development, to survey a route for a superpower transmission sys-

tem to start at the Grand Coulee and to include Spokane, Walla Walla, Pasco, Yakima, Ellensburg and Wenatchee. The bill authorizes the board to issue $10 millions in bonds for construction of the line and appropriates $50,000 from the state emergency relief fund to start the survey.

Stricter Utility Supervision

By a vote of 73 to 15, the house passed a senate bill giving the state department of public works stricter supervision of public utility companies. The measure provides that all gas, water and electric companies shall come within the classification of a public service company, and that the terms and conditions of contracts shall be under the supervision of the department.

▼

Farmers Plan Boycott On San Joaquin Power

When A. Emory Wishon, president, San Joaquin Light & Power Corp., refused on behalf of his company to lower agricultural power rates by 25 per cent in the San Joaquin Valley, pointing out that such a course was financially unwise, power users in that district started to institute a boycott on electric power wherever it could be dispensed with. Leaders in the movement have been busy interesting farmers in the use of gas engines, automobile motors and tractors until natural gas and diesel engines can be procured.

In a letter to the farmers, addressed to the Agricultural Power Users' Committee, Mr. Wishon recounted that it has been less than a year since rates were reduced by $575,000, and that before and since that reduction special interim provisions had been made which materially reduced the utility's income. Last year no interest was earned on common stock and only partial interest on preferred. However, the utility has arranged that agricultural consumers who are delinquent in bills for 1932 will be carried forward and that power will be supplied in 1933 upon payment of current monthly bills; that the credit department will analyze each individual credit application and will work with the applicant in obtaining credit from any source available or in extending credit where that is justified; and that, because some consumers criticize the demand form of rate, an optional rate of the minimum type has been filed.

In spite of these concessions, the boycott leaders insist a reduction should be made and are proceeding in an effort to secure funds from Reconstruction Finance Corp. or other federal agencies with which to purchase diesel or natural gas engines.

Into the field has come Natural Gas Service Co., owning wells in Kettleman Hills, with an offer which purports to furnish gas at a rate which will "insure farmers of a saving of as much as 65 per cent of present electric power charges for irrigation purposes." One of the proposals of the company is to pump irrigation water by means of gas lifts. The firm claims to have 35,000 hp. already signed, and in event the Railroad Commission refuses a certificate of convenience and necessity to the company on March 28, it plans to organize a mutual district.

Fresno Asks Valuation Survey

As a move toward acquistion of San Joaquin Light & Power Corp. facilities within the corporate limits of Fresno, the council of that city has asked the California Railroad Commission for a valuation survey of the utility properties. Formal application will be filed shortly. The law requires a lapse of 90 days after application before the commission can start the valuation, and this, together with an estimated six months needed for the completion of the survey, places the date of the final report as sometime near the end of 1933.

When Madera Took the Plaque

Quite a celebration was staged in Madera when the statewide contest for Red Seal homes brought to that district of the San Joaquin Light & Power Corp., the silver plaque and the grandfather clock-radio donated by the Pacific Coast Electrical Bureau. At the presentation were A. D. Church, J. E. Hammond, J. E. Barrett (holding the plaque won by the district and standing in front of the electric clock-radio which was presented to him as district manager of the winning district), H. G. Jobe, all of the San Joaquin company; Herbert Stitt, regional manager P.C.E.B.; E. G. Stahl, commercial manager; C. H. Edman, winner of the the central station salesman prize for the contest; and Victor W. Hartley, assistant managing director, P.C.E.B., who made the presentations

▼ ▼ ▼

California Utilities Threatened With Higher Taxes or Lower Rates

With representatives of public utilities on one side and revenue-seeking legislators on the other, the question of public utilities' tax in California has been argued in the state senate for the past month. Discussion revolves around the tax equalization bill which seeks to boost gross taxes from the present 7.5 per cent to 11.2 per cent (EWEST, Feb., p. 69, et seq.).

If taxes are not upped, it appears likely that rates will be lowered by the Railroad Commission; in a letter which was a rebuke for the failure of the senate to pass the equalization bill, Clyde L. Seavey, president of the commission, said that the commission is preparing to take drastic action on rates if the other course is not pursued. Also, in several appearances before a senate investigating committee since, Mr. Seavey has declared himself convinced that legislative action was surest and simplest, since the utilities could take a rate reduction to the courts for review. In light of the fact that the combined electric return is but 6.9 per cent, although 7 per cent is allowed by law, the legality of a rate reduction at this time would be questionable.

"However," Mr. Seavey indicated, "we will again go to the Supreme Court in an effort to lower the rate of return." While that court has not upheld any rate case in the last ten years yielding less than a 7 per cent return to the utility, the commissioner explained, he believed present economic conditions justified a lesser yield. The commission is aiming at a 6½ per cent

yield, which would cut more than $3 millions from Pacific Gas and Electric Co.'s gross and effect a total reduction of more than $9 millions in rates over the state.

Executive Salaries Aired

Lower salaries for high executives of utility companies also was advocated by Commissioner Seavey before the senate committee. While these salaries constitute only a fraction of 1 per cent of the operating expenses and consequently would have little effect on rates, it would be good public policy to trim them in these times, the commissioner feels; he added that, as an indication of the commission's good faith, the employees of that body were willing to take emergency reductions as a matter of state economy.

Responsibility for the state-wide criticism of the salary item rests primarily with the commission, which released the figures to the committee. In the past, there has been a tacit agreement that this information was to be considered confidential, although on file with the commission.

Also suggested was the reduction of dividends on utilities' common stocks to 6 per cent.

▼

Portland Utility Returns To Pepco Name

Restoration of the name Portland Electric Power Co., with the popular local contraction, Pepco, was enthusiastically voted by stockholders of Pacific Northwest Public Service Co. on March 15. A new director, John S. Coke, Portland attorney, was added to the board; the other ten, nine of whom are Portland men, were reelected, thus assuring local control of the company. A resolution was passed confirming confidence in Franklin T. Griffith, president, and his associates in the management.

Exchange of Central Public Service preferred stock for the old Pepco preferreds now is 85 per cent completed. The company hopes to have practically all of this stock in the transfer agents' hands so that the actual exchange can be effected by June.

▼

Thomas Utility Bill Passes Oregon House

Two major pieces of legislation affecting the electrical industry in Oregon were passed by the state legislature before it adjourned on March 10. The regulatory measure sought by Utilities Commissioner Thomas and previously passed by the senate (EWEST, March, p. 104), finally passed the house in the last few minutes of the session after an all-night meeting of the joint conference committee on certain proposed amendments. Several of the more drastic features of the bill, which would have made the commissioner a virtual dictator over public utilities in the state, were softened by amendments and limits were placed on the amount he could spend for investigation during any one year—the chief bone of contention in the committee. Funds for the operation of the department are to be raised by an assessment based on the gross revenues of utilities, which is expected to yield $150,000 annually. Additional funds may be raised by an added assessment against utility earnings, within certain limits, on approval of the state emergency board.

The mandate of the people, as expressed at the general election in November in the passage of a constitutional amendment providing for state-owned power, was construed by the legislature in its approval of the so-called grange bill. This permits the state to go into the power business, but provides that each bond issue contemplated by the commission which administers the act shall be passed by the people. A fund of $100,000 was provided through the authorization of an initial bond issue for preliminary investigation and for the expense of setting up machinery to make the act workable.

▼

Seattle Calls for Bids On Construction Program

Under plans approved by Seattle's city council utilities committee, a $3½ millons construction and financing program has been thrown open to competitive building among contractors. Superintendent J. D. Ross will open the bids on April 26 and compare the offers with arrangements completed with Reconstruction Finance Corp. and New York bankers for straight loans on city bonds. Bidders will be required to take city bonds at par for the new work and to furnish enough cash on additional bonds to retire the warrant debt.

The R.F.C. has offered to advance $1,625,000 at 6 per cent to complete the new construction and New York banks offered money at similar terms on bonds to retire the warrants, provided an audit of the City Light accounts and records for the last three years and nine months shows a satisfactory condition. Mr. Ross believes better terms can be obtained. In calling for bids, it can be ascertained definitely what the work will cost and the council then can decide whether to await definite action by the R.F.C.

County May Pay Light Bills

City and county officials have worked out a plan by which King County, in which is Seattle, will assume responsibility up to $2.20 for electric light bills of indigent unemployed, or $2.50 where electricity is provided for cooking, the sums to be paid by the city and county to City Light. Water bills up to 35 c. a month also will be paid for by the county.

▼

Alameda Approves Power Contract With P.G. and E.

While city officials study plans for a municipal generating plant, Alameda's (Calif.) board of public utilities approved a new contract with Pacific Gas and Electric Co. to supply the city with wholesale power to be distributed over city-owned lines. The contract, to run for five years at the same rates now in force, replaces a similar one expiring on May 15.

▼ ▼ ▼

Reaching Airway Salesmen the Air Way

IN THE belief that stimulation of salesmen to greater efforts is the most logical method of stimulating sales, T. Russ Hill, vice-president, Airway Electric Co., Toledo, Ohio, recently completed a 6,000-mile flight, visiting nine company offices in the Middle and Far West via air.

To save time, he decided to hold sales meetings at the various airports in the cities where district offices are located. Accordingly, district managers at Chicago, Denver, Cheyenne, Salt Lake City, Los Angeles, San Francisco, Portland, Seattle and Vancouver, B. C., were told to have Airway salesmen at the airport to meet Mr. Hill on certain designated days. When weather conditions permitted, meetings were held in open air; otherwise, accommodations were secured inside the airport. The full swing took seven days, almost to the hour. The picture shows Mr. Hill at United Airport, Los Angeles.

B.C. Electric Gives Away Water Heaters

21 THE DAILY COLONIST, VICTORIA, B.C. SUNDAY, MARCH 5, 1933

B.C. ELECTRIC OFFERS

FREE INSTALLATION

With All Electric or Gas Ranges, Whether Purchased From B.C. Electric, or Your Local Gas or Electrical Appliance Dealer

WE ALSO OFFER TO ANY B.C. ELECTRIC CUSTOMER A

FREE WATER HEATER

(Gas or Electric, According to Circumstances) Absolutely Fully Installed Without Cost

Taking Advantage of These Offers Will Help the Emergency Employment Plan

If you accept the B.C. Electric invitation to have a gas or electric range installed without any connection cost, or a water heater absolutely free of charge, you will be aiding the Emergency Employment Plan in providing work to scores of men. From $25,000 to $35,000 will be spent by the B.C. Electric during the next few weeks on materials and labor.

To install the electric ranges within the homes of the purchasers, more than scores of dollars will be expended for labor and material. This expense will be wholly borne by the B.C. Electric. In addition, other large amounts will be paid out for line material and labor necessary to connect the ranges to the B.C. Electric system.

The installation of the gas ranges and the distribution of free gas water heaters will create employment for main layers, service men and fitters. Thousands of dollars will thus be put into local circulation both in wages and materials. This expense will be borne entirely by the B.C. Electric.

This does not take into effect the stimulus the additional business will give to the leland coal mining industry, nor gas being made from Island-mined coal.

In addition a start is about to be made on a comprehensive gas main extension throughout Greater Victoria. $100,000 will be expended by the B.C. Electric on the project during the coming year the greater part of which will be for labor.

Prospective Gas Consumers in Proposed New Gas Main Area to Share in This Free Installation and Free Water Heater Offer

It is impossible to give the full details of this last item. Telephone us or call in at our Douglas Street salesrooms for all further information.

This makes available to everyone the benefits of electric and gas cooking and water heating, the B.C. Electric Railway Company is, for a limited time, making an unprecedented offer to its gas and electric customers in Victoria and vicinity.

Briefly, our offer is this:

1. Any electric or gas range purchased will be installed free of charge on the first floor of your home. This offer is available whether you purchase your range from B.C. Electric Stores or from any electrical or gas appliance dealer.

2. We will supply and install absolutely free of charge (a) an electric water heater (tank immersion type) or (b) a gas water heater (tank type). These can also be obtained free through your electrical or gas appliance dealer.

As these offers are made to extend the use of gas and electric current, the free installation of ranges and water heaters will be restricted to certain cases.

For instance, where a gas range is already in use, an electric range will not be installed free. Nor will a gas range be installed free where an electric range is in use.

As heretofore, flat rate electric water heaters (tank type) will only be installed where an electric range is in use. This is a service provided at very low cost per kilowatt hour to accommodate electric range users. Therefore, only existing or new electric range users will be given flat rate electric water heaters.

Gas water heaters will be provided free **to any customer** on our gas mains who does not already possess one, but not to one who already has an electric water heater in use.

No free electric or gas water heaters will be supplied for replacement, as this offer is solely for the purpose of extending the use of these services.

The sole condition attaching to the free installation of water heaters will be the usual charge for an electric heater of $3 a month for the 750-watt size, and $4 a month for the 1,000-watt size, and a minimum charge of $1 a month for a gas water heater alone or $2 a month for gas range and gas water heater.

Free installation of ranges and free water heaters are available to any approved house owner.

Tenants will also be accommodated with a slight variation in procedure. Details will be explained by any B.C. Electric sales representative, or at our Douglas Street salesrooms.

Remember, this offer is available not only at B.C. Electric Stores, but also from your own gas or electrical appliance dealer.

Free installation will be allowed for any make of electric range having a total connected load of 6 kilowatts, or for any gas range having three or more burners.

Where necessary arrangements have been made with the Company by customers, electric water heaters will be supplied to any bona fide dealer for installation by them, and must be installed according to the electrical by-laws.

In the case of gas ranges sold by gas range dealers, gas water heaters will be supplied and installed free by the Gas Department of the B.C. Electric Railway Company.

QUESTIONS *and* ANSWERS

Q—What do electric ranges cost?

A—From $86.75 up, with semi-automatic controls at $104.85, and fully automatic models at $139.75 up.

Q—What do gas ranges cost?

A—From $79.50 up. Ranges with automatic heat control can be obtained from $99.95 to $80.00.

Q—What is the cost of operation of an electric range?

A—A good average is 1 cent a meal per person. Most bills approximate $1 a month for each person in the family, or about $5 a month for a family of four.

Q—What is the rate for current used for electric cooking?

A—Many ray current is charged in Victoria and suburbs at the 2-cents a kilowatt hour rate which is enabled to users on the general lighting consumption is passed. In no case in Victoria and district is this second step of the rate higher than 2 cents a kilowatt hour.

Q—How does the cost of gas cooking compare with electric?

A—It is about the same.

Q—Can I save money by cooking with gas or electricity?

A—Yes, because you use the gas or electricity only when you need it, because at the smaller shrinkage of meats in the insulated ovens, because you can prepare a whole meal of several dishes prepared at the same time in the insulated ovens, and because with less dirt in the kitchen your draperies and decorations last longer.

Q—If I am eligible for either a gas or electric water heater, which should I select?

A—Our representatives will advise you as to your particular requirements. In the case of a family of four under the 1,000-watt electric water heater at $4 a month, but a gas water heater, will, of course, supply a family of any size.

Q—What rate is charged for gas water heaters?

A—The same rate as your gas range, but if you have a gas fire, gas refrigerator or gas water heater, you will be billed on the combined basis under the 1,000-watt electric water heater at $4 a month, but a gas water heater, will, of course, supply a family of any size.

Q—What rate is charged for gas water heaters?

A—The same rate as your gas range, but if you have a gas fire, gas refrigerator or gas water heater, you will be billed on the combined basis under the 1,000-watt electric water heater at $4 a month, but a gas water heater, will, of course, supply a family of any size. This brings down the cost of water heating materially.

Q—Can I have a rent gas water heater if I have neither a gas nor electric range?

A—Yes, if you are already connected to our gas mains.

Q—Can I have a free gas water heater if I have an electric range?

A—Yes, if you are at present connected to our gas mains.

B.C. Electric

PHONE YOUR ORDER FOR RANGE OR WATER HEATER OR USE THIS COUPON

B.C. Electric Railway Company
Victoria, B.C.

I am considering taking advantage of your free offer of a water heater. Please advise me as to the best type to use.

_____ I cook with gas.
_____ I cook with electricity.
_____ I do not cook with either gas or electricity but would like further information.

Name _____
Address _____

Complete displays of ranges will be seen at our Douglas Street Store, corner of Pandora Avenue.

Electric ranges also will be on view at our Cobble Hill, Sooke and Sidney agencies.

EASY TERMS ON RANGES

Both gas and electric ranges may be purchased on easy terms of 5 per cent down, balance spread over 30 months.

Telephone orders for free water heaters may be made to your nearest B.C. Electric Store. In Victoria, phone G 4rdens 7121, and ask for "Water Heating Department."

Orders will be executed in the order that they are received. We anticipate a rush but will do our best to supply customers within a reasonable time.

This offer is for a limited time and the B.C. Electric reserves the right to withdraw it at any time without notice.

FROM a comparative standstill, sales of electric ranges in British Columbia have jumped to the highest mark in the past two years as a result of an unusual merchandising plan developed by B.C. Electric Railway Co. for the dual purpose of relieving unemployment and increasing load. For the time the plan is in effect, ranges will be installed free and water heaters and their installation will be donated by the company, no matter whether the sales is by a B.C. Electric store or by an electrical dealer; B.C. Electric stands the bill in all cases.

As the company has a gas department, the same offer is made on gas range and water heaters, which many electrical firms in Vancouver also handle. However, the offer does not apply in the cases where the installation of an electric range would replace gas, or vice versa. Nor will electric water heaters be given free and installed except where an electric range is purchased or already installed.

While the "free" offer applies only to home owners, tenants can obtain the benefit by paying the regular cost of the range installation, or the cost of the water heater and installation, in installments, these being guaranteed by the owner. If the tenant pays cash for his purchase, the owner's guarantee is not needed. At the end of two years, if range and water heater have been in continuous service, the entire cost is refunded by the utility. The electric heaters may be disconnected in winter when the furnace coils are in use, it is provided.

Water heater sizes are determined by the size of the family, a small family being provided with a 750-watt, immersion-type heater costing $3 a month to operate, and a larger family taking the 1,000-watt size costing $4 a month. Not only does the central station supply heaters free to dealers to donate to approved customers, but it also pays a commission to the dealers: $1.25 for a 1,000-watt heater and 75c. for the 750-watt unit. In buying a range, either from utility or dealer, 5 per cent down is required and the balance spread over 30 months.

B.C. Electric announced its plan in connection with an employment drive in the province on the ground that the plan also was a proposal whereby many could be put to work in the electric and gas industries. The company estimates that from $125,000 to $150,000 will be spent in Vancouver for materials and labor during the period of the offer, this sum going to contractors, supply houses and dealers; an additional $25,000 will be spent in Victoria. Moreover, in Greater Vancouver alone will be used $20,000 worth of materials and $15,000 worth of labor in range installations, while $50,000 will be spent for line material and labor necessary to connect the ranges to the system. No less than 60 electrical contractors will benefit from the work, draymen will be employed to deliver the ranges and inspection fees to cities' electrical departments will be considerable.

This offer was advertised extensively in newspapers throughout the company's territory, with electrical dealers using much newspaper space and direct mail to tie in.

▼

Tacoma System Will Spend $249,000 in 1933

Tacoma's Department of Public Utilities will spend about $132,000 for construction and improvement work and $117,000 for maintenance of power plants and appurtenant structures in 1933, it has been announced. Included are $7,000 for new construction, $35,000 for reconstruction, $50,000 for substation and major equipment and $40,000 for carry-over work.

Settlement of the claim of the department against Coast Constructors, Inc., and bondsmen for the defective construction of the city's steam power plant and condenser intake has been effected for $25,000. The city's claim was for $44,028.86.

▼

Campaign Starts on Identified Cords

Started in Chicago, the identified cord movement, sponsored by the electrical cord manufacturers of N.E.M.A., promises to spread to 106 cities of over 100,000 population in the United States, much along the same lines as the campaign developed in Chicago. The technique consists of training departments of electricity inspectors, having them call upon all dealers and selling them the advantage of requiring that all appliances supplied them be equipped with these bracelet-labeled, approved cords. Radio talks, talks before electric associations and other civic groups, including Parent-Teachers and women's club

groups, also are necessary to acquaint the public with the necessity of insisting upon the bracelet label on appliances purchased by them.

Benefits accruing from such a movement are: (1) Elimination of the most prolific source of trouble and reduction in service calls by utilities, (2) dealers provided with sales talks, enabling them to place emphasis on quality and safety, (3) dealers educated to select dependable merchandise and thus lessen price appeal, and (4) jobbers profit because better grades of merchandise receive favor.

▼

Northwest Engineering Section Meets April 20

The tenth annual group meeting of the Engineering Section of the Northwest Electric Light & Power Assn. will be held in Portland, April 20-22, at the Heathman Hotel, according to an announcement by E. H. Collins, The Washington Water Power Co., chairman. Considerable committee work has been concluded and the program is fast being whipped into shape. The tentative program follows, all reports, papers and discussions being heard in general session:

Thursday, April 20

8:30 a.m. Registration.
9:00 Electrical apparatus (including meters).
2:00 p.m. Prime movers.
4:00 Accident prevention.

Friday, April 21

9:00 a.m. Codes.
10:00 Overhead systems (including foreign systems coordination).
2:00 p.m. Power systems engineering.
3:30 Underground systems .

Saturday, April 22

9:00 a.m. Hydraulic power.

Report of the Sales Section meeting, held in Portland from March 30 to April 1, will be made in the next issue.

▼

Rocky Mountain Power Association Continues

With the P.C.E.A. already decided to continue as an independent power association since the dissolution of the National Electric Light Assn., and the meeting of the executive committee of the Northwest Electric Light & Power Assn. scheduled for March 30 to decide what course to pursue, comes the announcement that the Rocky Mountain Division, N.E.L.A., comprising Colorado, Wyoming and New Mexico, has formed a regional organization to be known as the Rocky Mountain Electrical Assn. Headquarters of the new association will remain in Denver, with George E. Lewis as executive secretary.

Officers are: Fred Norcross, Home Gas & Electric Co., president; J. J. Withrow, Sheridan County Electric Co.; Gene B. Buck, Public Service Co. of Colo.; and K. W. Kissick, Deming Ice and Electric Co., vice presidents; A. C. Cornell, Graybar Electric Co., treasurer. Four major committees will handle the activities of the new organization: Engineering, A. H. Heitzler, Public Service Co. of Colo., chairman; Business Development, H. L. Pinkerton,, Albuquerque Gas & Electric Co., chairman; Accounting, H. A. Mitchell, Public Service Co. of Colo., chairman; and General, W. D. Johnston, Mountain State Power Co., chairman.

Besides the officers and committee chairmen, the executive committee consists of: Arthur Prager, Albuquerque Gas & Electric Co.; Clare N. Stannard and J. E. Loiseau, Public Service Co. of Colo.; Thomas W. Hughes, Rawlins Electric Co.; and A. L. Jones, General Electric Co.

▼

Unapproved Radios Ousted From San Francisco

San Francisco radio distributors and manufacturers, upon agreement with Ralph W. Wiley, chief of the department of electricity, on March 20 called in from dealers all sets not approved by Underwriters' Laboratories and in the future will not deliver any set not so approved. It has been agreed further that no provisional approval will be granted during the period a new model is being tested by the Laboratories. Legal action will be taken against any manufacturer, jobber or dealer who attempts to sell any unapproved radio, in line with the provisions of the ordinance passed last year to block movement of all such appliances in the city and county of San Francisco.

▼

Code Changes of N.E.M.A. Interest Contractors

Proposals to the Codes and Standards Committee of the National Electrical Manufacturers Assn. for changes in the National Electrical Code in its next revision are of interest to electrical contractors because of the installation angle involved in practical application. These proposed changes come chiefly in respect to the work of the joint committee on wiring methods for electric ranges and water heaters. Of particular interest are the following:

A recommendation is made to extend the exceptions to Table 1, Section 503, to allow the use of No. 4 rubber-covered wire and No. 4 bare wire in a 1-in. conduit for runs having not more than the equivalent of two quarter bends and not exceeding 50 ft. in length.

Another recommendation, objected to by the rigid conduit section of N.E.M.A., is that installation of more than one service into a house be permitted, provided they are grouped at a point of entrance and fed by a single drop from the pole. The rigid conduit section objects on the ground that nowhere else in the code is it permitted to reduce the size of conductors without overload protection.

News Shorts

¶ Seattle's Board of Public Works awarded Allis-Chalmers Mfg. Co. a contract for two pumping units for a pipe line on a $6,157 bid. Pumps will have 200-hp. motors.

¶ Los Angeles Bureau of Power & Light, continuing construction program launched earlier in 1933, has appropriated $524,870 for betterment and extensions, started spending it in March.

¶ A.I.E.E., Pacific Coast Section, will have its annual meeting at Salt Lake City, Sept. 4-8.

¶ Colorado Public Utilities Commission decided that a company which provides electrical energy to a municipality or company for retail distribution is not a public utility and, therefore, not required to obtain a certificate of public convenience and necessity.

¶ Washington Gas & Electric Co. will spend $50,000 in Everett this year to cover operations, a portion to be used for replacements and repairs to plant and distribution system.

¶ Pacific Gas and Electric Co. has petitioned Federal Power Commission for permission to abandon part of its power development project on South Fork of American River.

¶ Kilowatt-hour tax in Idaho will remain the same, the bill to double the rate having failed in the legislature.

Market Review

California and Intermountain—

For a month that was ushered in with a ten-day bank holiday, March has shown up surprisingly well in the electrical industry. As it closes, there is definite upturn in the trend of optimism, even though the volume of orders and power output reflect but little gain. The most heartening symptom that the long-awaited business upturn is imminent is the gradual strengthening of prices during the last 30 days. Prices of raw materials have advanced and much quiet buying of these commodities has been reported. Indicative of this price movement is the 5 per cent advance in sockets and the 10 per cent advance in certain types of switches and plugs, effective the latter part of the month. Inventories are being increased in many lines in anticipation of further price advances.

Central station purchasing still is confined to the barest of necessities, the volume of which is negligible with only one large order for two carloads of insulators for a southern California utility reported during the month. How-

ever, there is evidence, from the increases both in the inquiries and orders received, that the general industrial business is picking up slightly. Mining equipment sales are appreciably better, but, even with whatever improvement in general sales may be recorded for the month, the movement of electrical equipment remains slow.

Looming large in the construction picture of the month are the eleven new post office buildings, totalling over $2,500,000, and the $5,850,000 Federal building for Los Angeles. Favorable action on the beer legislation has speeded the activity in brewery construction, new breweries being contemplated for San Jose, Sacramento and Eureka, in addition to those announced last month. Other projects for the territory include the $890,000 jail for the City and County of San Francisco, a $800,000 factory to be built in Oakland, a $28,000 stadium for San Jose, two small canneries, a large retail store building for Phoenix and one of equal size for Santa Ana.

The market for materials and supplies showed slight improvement during the month, but construction supplies will be required for the two San Francisco Bay bridges, both of which are now well under way. Repairing the area damaged by the earthquake is expected to create an appreciable demand for this type of equipment in southern California. That section also reports a small but steady demand from the construction activities along the Metropolitan Water District aqueduct. Refrigerators appear to be moving the best among the major appliances and March revealed a surprising demand for the higher-priced radio sets. In general, however, the appliance business is not far removed from its depression low, except in the Long Beach area where all types of electric cooking and heating devices command premium prices because the use of gas is prohibited.

Pacific Northwest—

As in other sections, the banking moratorium took its toll from the March electrical business in this territory. The lumber market, the most reliable index in this territory, remains dormant with only an increased activity on the part of box manufacturers to relieve it of complete stagnation. Depreciated Canadian money has fostered imports of foreign pulp to an extent that hampers any progress local pulp and paper mills may be making toward recovery, although certain mills report good commitments in pulp for rayon silk.

Gold mining is exceptionally good, especially in Alaska, and one large manufacturer reported the sale of a $40,000 hoist equipment to a large concern operating in the North. The prospects for rapid improvement in zinc mining also are good. No improvement is apparent in central station purchasing or retailing and the little appliance business reported was due largely to apartment house modernization.

With a cruiser and a destroyer under construction at the Bremerton Navy Yard and a schedule calling for the reconditioning of two ships a month, it is expected that considerable electrical business will develop from this activity. Noteworthy among the Navy contracts awarded during the month was one to the General Electric Co. for a $12,000 motor-generator set.

Prospective business includes a pumping and filtration plant for Lewiston, Idaho; a new baseball stadium for Seattle; a cannery for Salem, Ore.; a brewery for Cle Elum, Wash.; and several post office buildings for smaller cities in this territory. Apparatus and equipment sales are very slow, as is the appliance business. In the latter, sun lamps and food mixers appear to be the most popular, with the larger appliances in very little demand. Radio sales are few and confined to the lower-priced sets. Throughout the territory, general business has been poor during the month, but there is a much better feeling and high hopes that spring will bring a material improvement.

▼ ▼ ▼

Barometer

THE WEST was the only section of the country to attain equality in February with last year. Industrial operation in the Western states, measured by returns on electrical energy consumption in individual manufacturing establishments, rose to the same average level in February of this year as in February of 1932.

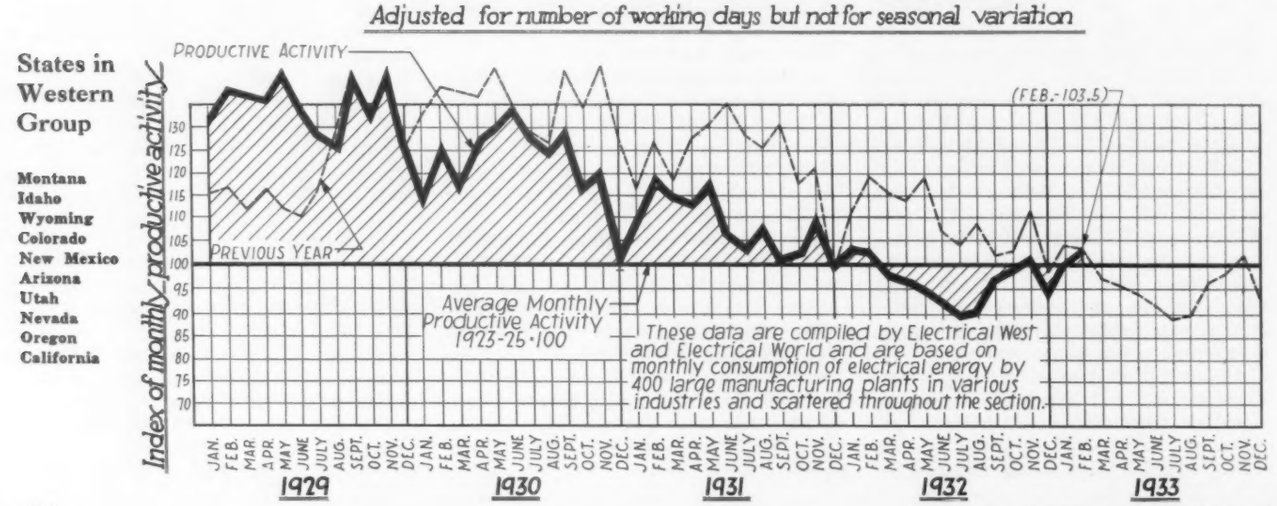
The metals group, forest products, shipbuilding, and stone, clay and glass operated at the same rate of activity, or higher, as that of a year ago. Each of these showed an advance over January and each is a construction industry or directly affected by activity in construction.

Indexes of Manufacturing Activity in the Western States

(All figures adjusted for number of working days)

	Feb. 1933	Jan. 1933	Dec. 1932	Feb. 1932
All industry	103 5	100.0	93.8	103.7
Chemicals	82.5	78.2	76.8	91.6
Food	121.0	116.2	113.2	127.0
Metals group	49.5	44.6	37.5	49.7
Forest products	148.0	145.7	130.3	135.2
Paper and pulp	129.1	138.4	125.5	139.3*
Rubber	46.8	76.2	50 2	98.1
Shipbuilding	121.7	107.3	112.4	87.4
Stone, clay and glass	83.7	78.0	64.5	80.8

* Revision



Contractor Dealer Inspector

Estimators Simplify Committee Structure

Harry Hamm, president of the Los Angeles Estimators' Section, in making his committee appointments for the new year, simplified the activities of the section and eliminated a number of former committees.

There are but four standing committees under the new plan of operation: entertainment, ordinances, engineering and editorial and advertising. R. L. Booth, English Electric Co., is chairman of the entertainment committee. Vic Sayre is chairman of the ordinance committee, Mr. Booth doubles as chairman of the engineering committee and J. W. Rose, Bureau of Power & Light, is chairman of the editorial and advertising committee.

George W. Kritzer, secretary of the organization, also is editor of the Estimator, a monthly publication of the section. Vic Sayre is vice-president of the organization, and M. L. Fish again is treasurer. The executive board consists of four past presidents: W. L. Hyde, P. N. Mactolf, L. H. Ellet and M. C. Williams.

▼

AS AN ENGINEERING SERVICE to the Independent Grocers' Alliance and, likewise, the establishment of a high-grade of installation upon which electrical contractors may profit, the Pacific Gas and Electric Co. has prepared the Official I.G.A. Store Lighting Manual, establishing standards for wiring, electric fixtures and lighting for all I.G.A. stores. William T. Bear, illuminating engineer for the company, worked out the standards. Bound in book form, the standards start out with a selling feature "Lighting Your Way to More Profits" and then provides list of outlets and wattages for three classifications of stores, together with floor-plan wiring diagrams for each and details of construction. According to R. E. Fisher, copies of the pamphlet are available to electrical contractors anywhere on the system for use in contacting I.G.A. store managers and for others maintaining similar establishments.

WOODWARDS STORES LTD., Vancouver, B. C., has entirely reorganized its electrical departments. In the future the washing machine departments operated on the lower basement and main floors will be under the control of the radio department. Major lines such as ranges, refrigerators and cleaners will be handled only in the radio department and will be in charge of J. B. Drain. The electrical department will concentrate on minor appliances, lamps, fixtures and electrical accessories.

From Construction to Merchandising

After many years of specializing in electrical construction work, the Electric Construction Co., of which L. G. Jeffery is proprietor, has celebrated its first year in the appliance display business at its new location at 1328 Fulton St., Fresno., Calif. The store was the first Westinghouse authorized merchandising store in California. H. L. Cramer, formerly with the Valley Electrical Supply Co., is connected with the company in charge of sales, and Mr. Jeffery devotes his attention to wiring and construction. Of late the company also has sold gas appliances as a balance to domestic appliance sales of other types, and has taken advantage of the natural gas boom

▼ ▼ ▼

R. C. MIXER, formerly General Electric's Bridgeport factory representative at Los Angeles, is with J. G. Pomeroy Co., where his wide acquaintance with electrical contractors, engineers and architects is of value in selling the construction material items for which the Pomeroy company is manufacturers' agent.

▼

Inspector President

A. M. McLEAN, president of the Northwest Section, International Association of Electrical Inspectors, is deputy electrical inspector on Portland's famous inspection department. Mr. McLean, like all inspection section presidents, is urging members to attend the big national convention this year at the Chicago world's fair, "A Century of Progress," which will be held during the week of Sept. 11.

W. L. HYDE, for a number of years estimator with George L. Patterson Co., electrical contractors of Los Angeles, and former president of the Estimators' Section of that city, started in business for himself under his own name at 228 No. Brand Blvd., Glendale, Calif. Besides electrical construction, Mr. Hyde will carry a complete line of appliances and radio and has equipped a repair and service shop.

F. B. NIGHTINGALE, formerly illuminating engineer, General Electric Supply Corp. at Los Angeles, is devoting his entire time to the creation and manufacture of illuminating specialties for Kim Mfg. Co., Los Angeles. Mr. Nightingale is manager of the organization, which specializes in lighting problems requiring the manufacture of special equipment. It carries a complete stock of commercial, industrial and floodlighting fixtures.

FARR, ROBINSON & BIRD Ltd., electrical contractors of Vancouver, B. C., were awarded a contract involving the design, fabrication and installation of lighting fixtures in a large residence being erected on Marine Drive, Vancouver. All phases of the work are being handled in the company's plant in Vancouver.

BALES ELECTRIC SHOP, of Huntington Beach, Calif., has moved to a new store location at 217 Main St. and has added a radio service department to its electrical contracting department.

Personals

Guy Talbot Retires as Oregon Utilities President

RETIREMENT of Guy W. Talbot as president of Pacific Power & Light Co., Northwestern Electric Co., Portland Gas & Coke Co., and Inland Power & Light Co., and the assumption of this position by Paul B. McKee, formerly general manager of The California Oregon Power Co. and more recently president of the Brazilian Electric Co., of Rio de Janeiro, was an announcement of considerable interest to the electrical industry late in February.

Mr. Talbot retains his position on the board of directors of all four companies and becomes chairman of the board of Portland Gas & Coke Co., succeeding C. F. Adams, Portland banker. His first step will be an extended trip to Europe to build up a failing health, which was the cause of his retirement. Mr. McKee, who was in Portland at the time of the announcement, will return to Rio to turn over his interests there to his successor and will go to Portland in May to take up his new responsibilities.

Mr. Talbot's career of over forty years has been spent wholly in the transportation, power and gas business, commencing in the freight yards of the Burlington railroad at Des Moines, Iowa, in 1892. After several years of railroading in the lower employee brackets, he became general manager of the Peoria and Pekin Terminal railroad at Peoria, Ill. He came to Portland, in 1906 as vice-president and general manager of the Astoria and Columbia River and the Corvallis and Eastern railroads, then under control of A. B. Hammond, of Astoria, Ore., and San Francisco. The following year Mr. Hammond disposed of his interests and Mr. Talbot found a new connection through a group that was organizing and building the Oregon Electric railroad to ply between Portland, Albany and Corvallis. Managing this property, he built up a business that proved attractive to the larger systems in the territory, and in 1910 sold it to the Spokane, Portland and Seattle railroad, now part of the Northern Pacific and Great Northern systems.

Among the organizers of the Oregon Electric were S. Z. Mitchell, of Electric Bond & Share Co., and W. A. White, who later interested himself in The Washington Water Power Co. On the sale of the railroad property, Mr. Mitchell and his associates entered the power and light field in this territory and launched Mr. Talbot on his career of organizing, developing and financing the four large electric utilities he since has headed.

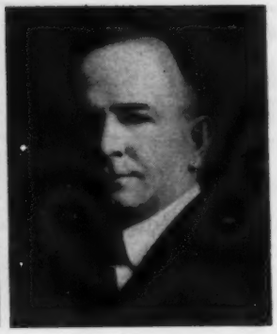
The first company to be organized was Portland Gas & Coke Co. to acquire the Portland Gas Co., which was the outgrowth of a local enterprise started in 1859. Pacific Power & Light Co. was next organized in the same year, 1910, around the nucleus of electric, gas and street railway properties in Astoria. It rapidly acquired other isolated properties, mainly in eastern Washington and Oregon, and the period of development in improved generating facilities and connection by high tension transmission that followed serves admirably to exemplify some of the best accomplishments of the light and power industry, in growing up with and fostering the business and industrial growth of the country.

In 1925 the American Power & Light Co., which had acquired the two other properties, bought the Northwestern Electric Co. in Portland from the Fleischaker interests, and Mr. Talbot was made president of that company as well. Inland Power & Light Co. was organized in 1929 to own certain physical properties recently completed or then under construction, which were not readily financiable under the mortgages of the existing companies. In the growth of these properties from 1910 to 1930, upward of $55,000,000 of new money was secured and spent under Mr. Talbot's directing genius.

Mr. Talbot was born in Centerville, Mich., in 1873, and spent one year at Emporia College, Emporia, Kan. A genial disposition and a gracious and humanity-loving personality have endeared him to a host of friends in and out of the industry, who will rejoice when his regained health will again permit him to take up his advisory responsibilities with the companies he founded.

GUY W. TALBOT

PAUL B. McKEE



FLOYD N. AVERILL

McKee Is Westerner

Paul B. McKee, who succeeds Mr. Talbot, is a man of the West, with an understanding of Western psychology and Western ways. Born in San Francisco in 1891 and with an E.E. degree from Stanford in 1914, he immediately set out after some practical construction experience. In 1916 he commenced his utility operating experience as assistant to the president of The California Oregon Power Co., becoming vice-president and general manager in 1920. Electric Bond & Share sought him in 1926 during a considerable expansion of its South American properties, and Mr. McKee accepted the position offered him at that time with American & Foreign Power Co. in Brazil. His election as president of the Brazilian Electric Co. came in 1927 and he has held this position continuously since, making his headquarters in Rio.

He was on one of his periodic visits to New York when he was offered the presidency of the Portland companies, and after a visit to look over the situation, accepted.

▼

Floyd Averill Starts as Bell Hanger in Indiana

FLOYD N. AVERILL, who has just retired as president of Fobes Supply Co. and as Pacific Coast manager of Westinghouse Electric Supply Co., (EWEST, March, p. 110), has been an active figure in the electrical industry of the Pacific Northwest since the turn of the century. His electrical career, however, started some years earlier in his natal state, Indiana, and one of the prize pictures in the extensive gallery of electrical men that graces his office walls is an 1894 chromo of himself equipped with spurs to prove his right to the title of "lineman."

His initial electrical venture was in Angola, Ind., in 1891 with the firm of Averill & Flowers . . . "bell hangers," he calls them, since the principal business was the installation of bells. But he soon outgrew bell-hanging and took up arc-trimming for the Angola Schuyler Electric Light Co. in 1893. This activity was followed by a period in which he installed telephone and central station systems in Angola and Fremont, Ind., and Traverse City, Mich.

He came West in 1900 to become associated with Al Welch and Fred Newell in the Northwest Electric Engineering Co., Portland. With this concern and on his own hook he left his mark on early hydro-electric development in the Northwest, building plants at Lostine, Burns and Baker, Ore.; Weiser, Idaho; and Olympia, Wash. Of these monuments to his construction genius, the Tumwater plant at Olympia and the Rock Creek plant at Baker still are running. The Rock Creek plant was the first high head development in the Northwest, 980 feet. It was during this period that Mr. Averill tells of losing a good-sized contract by revers-

ing a 25c. long distance telephone call.

For a time he acted as manager of Baker Gas & Electric Co. and Rock Creek Power & Transmission Co., which sold power to the Baker company. But he soon left this position to take up a jobbing career with E. N. Fobes, when in 1906 he opened the Portland house of Fobes Supply Co. With the death of Mr. Fobes in 1916, Mr. Averill became president. In the succeeding years, his indefatigable energy and genius for organization built a chain of electrical jobbing houses in Portland, Seattle and San Francisco. In January, 1923, controlling interest was sold to Westinghouse, and since that time Mr. Averill has headed the wholesaling business of that company in this territory, opening additional branches in Butte, Spokane and Los Angeles.

His activities in the electrical industry have been varied. His house was a charter member of the first Pacific Coast Wholesalers' Association and he, himself, has been chairman of the Pacific Division of N.E.W.A.

Inveterate sportsman, he has organized many fishing and hunting trips into the wilds of the Northwest, which are the subjects for hours of endless and exciting reminiscences among the voyageurs who have accompanied him, including H. E. "Sandy" Sanderson, Pete Bach, O. B. "Stuby" Stubs, S. W. Peterson, W. M. Deming, former owner of the "Journal of Electricity," and others. To have been on one of these excursions is to have communed with nature in the raw. Memorable ones were to the headwaters of the Skagit in 1911, on the upper Rogue in 1913, and by boat to the northern end of Vancouver Island in 1930. Most exciting was the trip down the Salmon River, Idaho, in 1922, a voyage through untrammeled wilderness that even the hardiest boatmen concede as extremely hazardous. A large flatboat built especially for the trip carried the party and supplies until a series of wrecks in the rapids persuaded the party that walking was safer. So they left the boat with its supplies to the captain and mate, who finally, in one grand wreck, tipped the stove containing the last quarter of venison over the stern. From here on, after repairs were made, the party made its way out to civilization on short rations of such canned goods as were salvaged.

Aside from the business responsibilities as director of the Pacific Coast Westinghoue Supply houses, there is little that stands in the way of countless enviable days on the 52-ft. cruiser, "Averilla," built in 1930, in the thousands of miles of inland waters stretching from Puget Sound to Alaska, where fish and game abound.

Mr. Averill is succeeded as Pacific Coast manager of Westinghouse Electric Supply Co. and as president of Fobes Supply Co. by R. J. Holterman.

▼

Lewis and Reppy Named To Edison Directorate

Stockholders of the Southern California Edison Company Ltd., at their thirty-seventh annual meeting held Mar. 17, elected Fred B. Lewis, vice-president and general manager, and Roy V. Reppy, vice-president and general counsel, as new members of the board of directors and re-elected the eleven incumbent members. With Mr. Lewis and Mr. Reppy, the board now includes: Harry J. Bauer, chairman; George I. Cochran, John H. Fisher, Albert W. Harris, A. N. Kemp, Ben R. Meyer, W. C. Mullendore, Donald O'Melveny, James R. Page, Henry M. Robinson and George C. Ward.

During 1932 there were three vacancies in the directorate, caused by the deaths of John B. Miller, chairman, and Russell H. Ballard, president, and by the resignation of Arthur H. Fleming. Mr. Mullendore, executive vice-president, was elected to the board during the past year. Mr. Bauer, addressing the stockholders, indicated that whenever the company has the opportunity to secure the services on its board of outstanding citizens, the policy will be for some of the company officials to resign from the directorate. In announcing this, Mr. Bauer expressed the opinion that the presence of too many officials of a company on a directorate might easily tend toward bureaucracy.

▼

E. C. Hayward Dies In Victoria

E. Chesney Hayward, pioneer in the electrical business of Victoria, B. C., partner in the electrical contracting firm of Hawkins & Hayward, and past-reeve (president of the city council) of Oak Bay, died suddenly, following a heart attack in his store. Born in Victoria in 1876, Mr. Hayward attended Stanford University, Palo Alto, Calif., graduated in electrical engineering and remained on the university staff there for some time. Leaving Stanford, he became professor of electrical engineering at Oregon State College, returning to Victoria in 1905 to enter the contracting business with T. W. C. Hawkins.

▼

FRIENDS and business associates of Richard E. "Dick" Smith, executive assistant of the Southern California Edison Company, were saddened to hear of the death on Mar. 19 of his only son, R. Allen Smith, 16 years of age. His death, at the Smith home in San Gabriel, followed a long illness. He was born Sept. 4, 1916, at Visalia, Calif., where Mr. Smith was sales manager for the Mt. Whitney Power and Electric Co., before he joined the Edison organization. Mr. Smith was advertising manager for the Edison company for many years prior to his appointment as executive assistant in October, 1932.

E. R. NORTHMORE, superintendent of electrical distribution, Los Angeles Gas and Electric Corp., was graduated into the 40-year class of that company at a banquet for the "Old Guard" in February. The list of 168 candidates for 10-year class honors included Eugene P. Ramsay, advertising manager.

H. M. CRAWFORD, general sales manager, Pacific Gas and Electric Co., announced the changing of sales managers in three of the company's divisions in March. Ward Schafer, sales manager at Stockton, for the San Joaquin division, has been moved to Eureka. R. E. Wadleigh, sales manager at Eureka, has been shifted to the Shasta division, with headquarters at Red Bluff. Harry Lee, sales manager at Red Bluff, has been given Mr. Schafer's post at Stockton.

T. H. NESS, division manager, Mountain States Power Co., has been elected president of the Marshfield, Ore., Chamber of Commerce. Mr. Ness also is president of the local Kiwanis Club. R. L. Stewart, manager at Coquille, Ore., is president of the Coquille Commercial Club.

GEORGE W. MILLIKEN, vice-president in charge of sales, Southern Colorado Power Co., has been elected to the board of directors of the Pueblo Chamber of Commerce to fill a vacancy caused by the resignation of W. N. Clark, president of the company, who was second vice-president of the chamber. Mr. Clark resigned because of pressure of work as head of the local R.F.C. relief committee.

PAUL GRIFFITH, Southern California Edison Co. Ltd., won low net in the second Los Angeles Electric Club golf tournament held Jan. 26. John Pringle, California State Railroad Commission, had low gross; Tom Parks, Los Angeles Gas and Electric Corp., won blind bogey after a draw with E. B. Chase, Ed Myers and Joe Mullenbach. Over 40 golfers were entered.

Santa Clara Leaguesmen

Secretary Larry Greer and President Fred Doerr, of the Santa Clara County Electrical Development League, photo-flashlighted after a recent semi-monthly meeting at San Jose, smiled to greet their new year of cooperative effort. Mr. Greer is dealer relations representative for the P. G. and E. Co. and Mr. Doerr is proprietor of the Garden City Electric Co., of San Jose

Manufacturer Distributor

Frigidaire Springs New Everything

New design, new prices, new features, new sales ideas, and a new low-priced model were all given spectacular first presentation to the Frigidaire sales organization, its dealers, and to central station representatives and guests at a series of sales convention shows carried on in "one night stands" throughout the West between Mar. 15 and 25. George S. Jones, Jr., central station manager for the company at Dayton headquarters, was in charge of the troupe which toured the Western cities with the new story. Al J. Harrison, well known in San Francisco and Los Angeles, and now sales educational and promotional manager for the Los Angeles district, was easily the star.

By means of sound pictures, Mr. Jones and other executives of the Dayton headquarters gave their personal messages to the field organization, and the newness of the new models, new engineering design and new styling were shown and explained in interesting detail. A complete redesign of much of the mechanism and of equipment features was shown. Then followed pictures or sales skits illustrating how the company's selling ideas and methods can be utilized in practice. These talkies and skits were more convincing than in the several years of previous Frigidaire sales conventions witnessed in the West.

Patterning itself after another of the General Motors family, the Buick line, the Frigidaire division this year will have both a complete standard line of refrigerators and a deluxe line, each with new low prices and additional features. The deluxe line inaugurates several important changes in design: The freezing unit is enlarged and made in a seamless, chromium-plated unit, with a coil even under its dividing shelf; the ice trays are ingeniously equipped with a lever-motion handle which pries the tray upward when the tray is withdrawn, thus eliminating sticking of trays. New tray designs, in both stainless metal and rubber, also are featured. The ice-making capacity has been measurably increased, and the freezing unit placed in the center of the cabinet, releasing more storage space on each side of it.

Selling slogan of the small refrigerator will be that its operating cost is no more than that of an ordinary lamp bulb. The unit uses a new low-temperature refrigerant and will operate almost continuously, apparently consuming approximately 40 watts. While concentrated sales effort will be made on "9's or better" (the deluxe 9 cu. ft. box), the company announced in the show that it felt the new small box, made in 4-, 6- and 7-cu. ft. sizes and designed to sell for $99.50 and up, installed on the Pacific Coast, will tap a new lower buying-powered class market not previously touched.

Air conditioning plans for the company are as ambitious and as well developed as the refrigerator plans this year. Equipment is being increased up to a 10-hp. compressor, with air filters, humidifying and dehumidifying units, and a more complete line of small-unit complete systems. Most interesting is the boiling down of the engineering estimate form for small, ordinary room installations, into a simple point system. Area of the room, exposed window space, number of people ordinarily occupying the room and such factors are evaluated in points, which, totaled up, give a reading in the size of the unit for the job. Thus salesmen themselves can estimate quickly and sell the installation on the spot without waiting for an engineered plan and specification. Large jobs will still be engineered.

With Mr. Jones in the troupe were H. H. Schnabel, who told the air conditioning plans; A. G. Letherby, who outlined the commercial unit story; J. W. Thiele, who outlined the market potential of the new low-priced box; and P. R. Jackson and H. P. Norris as staff men. Pacific Division Manager R. G. Hutchison accompanied the troupe on its Pacific Coast territorial trip from Los Angeles through San Francisco, Portland, Seattle and Spokane. R. E. Robertson, northern California region manager, and Tom Supplee, central station manager, also accompanied the convention party. Prize-winning salesmen honored and rewarded at the district conventions will be reported in the next issue.

▼

Lionel Executive Will Tour Coast

After the close of the Toy Fair in Chicago, May 1-13, Arthur Raphael, for years sales manager and now vice-president in charge of sales, Lionel Corp., will return to the Pacific Coast with M. Sweyd, of M. Sweyd & Son,

M. SWEYD

Lionel representative in the Western territory, for a tour of Far West cities. The Lionel Corp., having absorbed the Ives Corp., now will manufacture the Lionel-Ives line of mechanical trains as well as the line of low-priced electric trains.

Kelvinator Lowers Prices For 40 Days

Announcement of new low prices, guaranteed for the next 40 days against the possible effects of an expected upturn in commodity prices, was made on March 21 by George W. Mason, chairman of the board and president of Kelvinator Corp.

In making this announcement, Mr. Mason pointed out that the new prices for this limited time affect his company's entire line of 1933 household electric refrigerators, starting with a standard model at $97 installed, plus freight. Expressing his opinion that before the period has elapsed the cost of raw materials will be climbing, he reminded that this eventuality would necessitate a price revision upward.

Mr. Mason explained that the new low prices have been made possible not only because of the low prevailing costs in the raw materials market, but also by virtue of the widely-spread buying tendency that began with the passing of the banking crisis.

"At the end of the 40-day period," he said, "we are hopeful of finding that the buying movement, now so evident, will have extended into the materials field to such an extent that its prices will have advanced appreciably. Toward such a condition we are looking forward with anticipation, for a period of increasing prices will mean better times for the entire country."

▼

Western Utilities Join "On to Chicago" Forces

Many of the merchandising utilities in the West have entered into the "On to Chicago" contest of Hotpoint and, judging from past sales records and the above-average success of electric cookery in this section, a good army of Pacific Coast and Rocky Mountain salesmen will see the World's Fair at Edison General Electric Appliance Corp.'s expense.

Utah Power & Light Co. has started on a campaign which will involve 124 retail salesmen, making the contest one of the major selling campaigns of the year. Idaho Power Co. has entered 40 salesmen, California Oregon Power Co. and Mountain States Power Co. each have designated 30 entrants, and Public Service Co. of Colo. and Southern Colorado Power Co. have started a tie-in campaign for every one of their salesmen.

▼

THE GUTE CO., Ltd., manufacturers' agents of San Francisco, have moved their warehouse and offices to 308 Eleventh St. The firm also announced their appointment as California, Oregon and Washington representative for Victor Electric Products, Inc.

MAYDWELL & HARTZELL now are northern California and Nevada factory distributors for Sauter time switches, product of R. W. Cramer & Co., Inc.

Juniors Beat the Seniors

THIS window of the Los Angeles Bureau of Power & Light was one of 27 electric range windows unveiled during the week of an electric range drive sponsored by the Junior Electric Cookery Council of Southern California. This group, composed of salesmen, saleswomen and home economists (EWEST, Feb., p. 77), holds one meeting each month in a loft building owned by one of the utilities; six salesmen report at 3 o'clock to prepare, under guidance of a home economist, an evening dinner for the other members. On the occasion of the visit of A. H. Jaeger, field representative, National Electric Cookery Council, 200 members attended.

Revival of interest in electric cookery also followed an enthusiastic meeting of electrical dealers and central station commercial men in San Diego, March 2. Mr. Jaeger appeared at this meeting, presenting the program of the national council; A. E. Holloway, vice-president, and E. W. Meise, superintendent of merchandising, San Diego Consolidated Gas & Electric Corp., followed with comment. The attendance of 70 retail and wholesale outlets at this first San Diego council meeting was acclaimed by Mr. Holloway, who is sponsoring the work in that city.

Electric range selling in the Portland area received a stimulus in the week of March 13, also through the appearance of Mr. Jaeger and the conduction of a school for range salesmen, under the sponsorship of the Electric Refrigeration & Cookery Council of Oregon. Through a succession of meetings, the range story was told to 150 utility men, distributors, dealers and salesmen.

Mr. Jaeger first appeared at the regular Portland Electric Club luncheon. The same evening, some 50 heads of distributing firms and retailers met with manufacturers representatives and utility officials under council auspices. J. B. Buman, appliance sales manager, Northwestern Electric Co., chairman of the committee, presided. J. C. Plankinton, sales manager, Northwestern Electric Co.; A. C. McMicken, sales manager, Portland Electric Power Co.; and Tom Lennard, Ira F. Powers Co., chairman of the council, took part in the program.

The school was divided into two sessions. On the first evening, background material and the prospects for business were reviewed. On the next evening the salesmen were invited to a dinner prepared in their presence by three home economists: Mrs. Irene Kerr, Meier & Frank Co.; Mrs. Louis Espey, Northwestern Electric Co.; and Mrs. Margaret Hawley, Portland Electric Power Co. H. T. Timberlake, representative in the Northwest for the L & H company, took part in the program.

Particularly effective in bringing out numerous sales features of the range was the presentation by Orr E. Crites, appliance sales manager, Portland Electric Power Co. This was made with the help of a "visualizer," an illuminated picture device designed by Mr. Crites and showing charts, tables and pictures in an orderly fashion to get across the complete range story. Seventy-five salesmen attended.

▼

Flying Squadron Will Tell Leonard Sales Story

Leonard Refrigerator Co. has launched a series of retail schools for the benefit of dealers and salesmen which, when completed late in May, will have carried the story of the new Leonard line of refrigerators and the 1933 sales and advertising program to 5,000 members of the field organization. The schools, scheduled for key cities, are being conducted by a flying squadron of executives from the company's headquarters in Detroit: R. I. Petrie, general sales manager; A. M. Taylor, director of merchandising, and others.

Denver is the first Western city to be visited, on April 28; from there, a Pacific Coast swing includes Phoenix, May 2; San Diego, May 4; Los Angeles, May 5; Fresno, May 8; San Francisco, May 10; Sacramento, May 12; Portland, May 15; Seattle, May 16.

In each city, the program starts with a luncheon or dinner; the line is then introduced by slide films and actual models. Slide films and graphic charts show the advertising and sales plans, and two motion pictures show window demonstration and a trip through the factory. The program runs for 4 hours and 15 minutes.

▼

LISTENWALTER & GOUGH, in southern California, and Holbrook Merrill & Stetson Inc., in northern California, are agents for Bond Electric Corp., manufacturers of "Frostoff," a device for automatically defrosting refrigerators.

SYDNEY A. BECK, district manager for The Estate Stove Co., has moved his offices to the Harper-Maggee Bldg., 554 Irving St., Portland.

FRED W. CARLSON, representing Pennsylvania Transformer Co., Automatic Switch Co. and others, and Leland Electric Co. have moved to 312 Ninth Ave., North, Seattle.

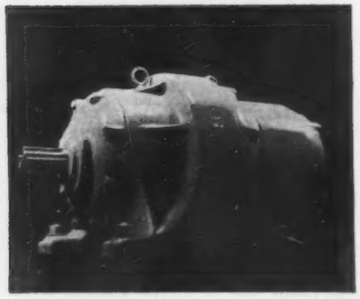
J. G. CORRIN, Los Angeles, has been appointed California, Nevada, Idaho, Utah, Arizona and New Mexico representative for The White Rubber Co., makers of linemen's rubber gloves.

EDWARD WESTON, founder and chairman of the board, Weston Electrical Instrument Corp., has been awarded the 1932 Lamme Medal by the A.I.E.E. for his "achievements in the development of electrical apparatus, especially in connection with precision measuring instruments."

HEXACON Electric Appliance Corp., manufacturers of soldering irons, have appointed E. H. Bell as southern California representative.

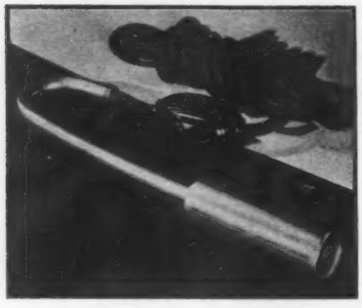
New Products

Syncrogear Motors



U. S. Electrical Mfg. Co., Los Angeles, has developed the Syncrogear motor, in any speed from 2 to 10,000 r.p.m., a self-contained, single-base, geared transmission, foundationed on a heavy gear pedestal base which withstands unusual torsional stresses inherent in geared, high-torque reduction. Said to minimize cantilever stresses from overhanging gears by short train structure. High-speed gears not permitted to be submerged in oil reservoir. Motor insulated with asbestos and electrically impregnated.—Electrical West, April, 1933.

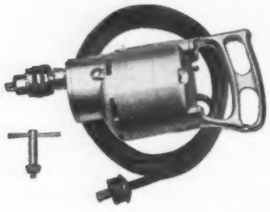
▼



Aquarium Heater

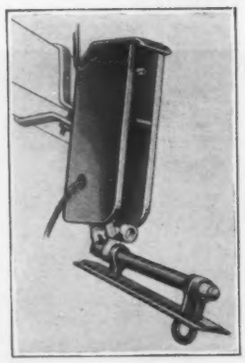
Complete with built-in thermostat, an electric aquarium heater, developed by Edwin L. Wiegand Co., Pittsburgh, is available to operate on 115 volts, a.c. Manufacturer claims it will hold temperature of any size aquarium at 75 deg. F. automatically, provided aquarium requires not more than 75 watts per hour in heat losses. Also available with thermostat set at 80 deg. Overall length, 10 in.; embedded type Chromalox element; has "off" and "on" switch, 6-ft. rubber cord; plated to resist corrosion. Retail price, $6.50.—Electrical West, April, 1933.

▼



Electric Drill

A portable electric drill for light duty is announced by Signal Electric Mfg. Co., Menominee, Mich., with drill body and handle of cast aluminum, length 11¼ in., diameter 4 in. Weighs 6 lb.; has Signal Universal motor for d.c. or a.c., 110 volts, 25 to 60 cycles, speed no load to 1,700 r.p.m. Three-jaw chuck, capacity up to ¼ in.—Electrical West, April, 1933.



Fuse Cutout

When a fuse blows, cartridge and door assembly is automatically released on the Tripomatic fuse cutout developed by James R. Kearny Corp., St. Louis, leaving the circuit entirely open. This facilitates the finding of the blown fuse and it makes removal of fuse cartridge easy. Fuse links are of new design and lowest amperage size is tested to sustain weight of 5 lb. in tension, making practical the use of fractional amperage links. These are made in ¼, ½ and ¾ amp. sizes for use in the Tripomatic cutout.—Electrical West, April, 1933.

▼

Floodlights

Electric Service Supplies Co., Philadelphia, announces two new Golden Glow projectors, type B (shown) and type N-94. Type B has composite, deep-bowl glass mirror, encompassing maximum output and being resiliently mounted by spring supports to sheet aluminum housing. Knurled exterior nut provides for focusing without tools. Door frame held to body by three clamps. Type N-29 is low-priced, weather-proof unit. Reflector and body of pure sheet aluminum; lens 9¼ in. in diam.; net weight, 3½ lb. List, with clear lens, $8; with amber, red, green or blue lens, $9.—Electrical West, April, 1933.

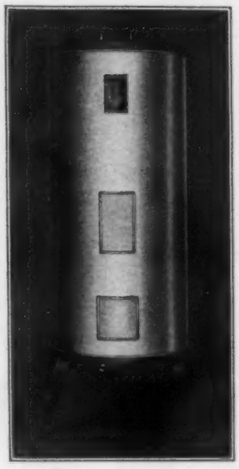
▼

Rubber Plug

Just introduced by Hatfield Wire & Cable Co., Hillside, N. J., is a one-piece rubber plug, adaptable for either light or heavy appliances. Available in colors.—Electrical West, April, 1933.

Monel Metal Tanks

Solid monel metal tanks are used by Hewitt Electric & Mfg. Co., Arlington, Mass., for their storage-type water heaters in 30-, 50- and 60-gal. sizes. Tanks claimed to defy corrosion, tank scale and sediment; 20-year guarantee given. Will withstand pressure of 400 lb. Heating elements of laminated steel, instantly interchangeable; thermostat provided.; temperature adjustment from 140 to 200 deg. can be made easily.—Electrical West, April, 1933.



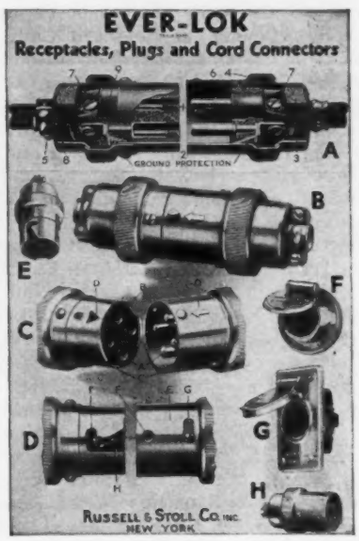
▼

Thermostat

Barber-Colman Co., Rockford, Ill., has introduced a 3-wire, low-voltage, duct-type thermostat that will not corrode and can be used where exposed to water vapor. All exposed parts of phosphor bronze except sensitive element, which is of bimetal. Models available in standard ranges.—Electrical West, April, 1933.

▼

Ever-Lok Devices



Russell & Stoll Co., New York, offers a line of Ever-Lok receptacles, plugs and cord connectors which have been approved by Underwriters' Laboratories. Features are: automatic locking (D) which relieves strain from electrical contacts; positive grounding (A) by double phosphor bronze springs; dust-proofing by means of sponge rubber gaskets; cadium-galvanized steel housings; interiors of molded bakelite. Receptacles (F & G) are adaptable to standard conduit boxes for replacements, but are furnished with boxes tapped to specification for new installations.—Electrical West, April, 1933.

OIL BLAST SAVES SPACE

At the left, an oil-blast breaker; right, a unit of plain-break type. Both have the same interrupting rating

BOTH of these 15,000-volt breakers have the same interrupting rating; the one at the left is smaller because of its oil-blast construction. The difference in physical size shows that greater interrupting capacity can be installed in a given space if oil-blast breakers are used.

In addition to saving space, oil-blast breakers reduce arcing time, contact burning, and oil deterioration. Therefore, they decrease maintenance expense. Their great speed in clearing faults results in less damage to cables and apparatus.

The smaller oil-blast breaker shown is one of the Type FKR-255 line—15,000 volts; 600 to 2000 amperes; interrupting ratings of 150,000, 250,000, and 500,000 kv-a. Other oil-blast breakers of 5000 to 230,000 volts and with interrupting ratings of 50,000 to 2,500,000 kv-a. are available.

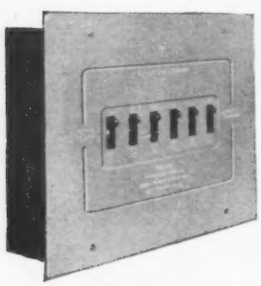
We shall be glad to send you descriptive bulletins on the various types of G-E oil-blast breakers. Write to our nearest sales office or to General Electric Company, Schenectady, New York.

470-38

GENERAL ELECTRIC

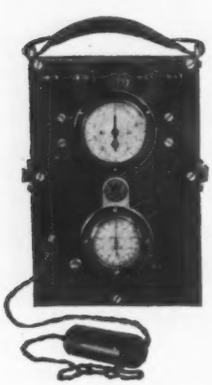
SOUND INVESTMENTS

IN these days when it is a tough job to match operating costs with reduced incomes . . . Westinghouse calls to the attention of power company officials and engineers a number of recent developments that make possible substantial savings in all phases of power distribution . . . savings that in many cases are sufficient to repay the cost of new equipment many times over.



Nofuze Load Center

New OC Detachable Watthour Meter



Portable Stroboscopic Meter Standard

1 *The New Metering System*

—consisting of the OC detachable meter, the Nofuze Load Center, and the Stroboscopic Meter Standard —revolutionizes metering practice. It saves money by guarding revenue, lowering installation costs, insuring regular readings and billings, reducing meter testing time and eliminating customer fuse renewals and resultant service costs. For these reasons many power companies have embarked upon extensive meter replacement programs.

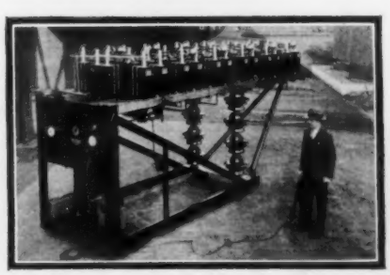
2 *The Surge-proof Distribution Transformer*

prevents lightning's annual toll of damaged equipment and service costs. This transformer detours lightning surges to ground so fast that primary fuses cannot blow or lamp loads even flicker. The three-point protection is built in, so that the transformer is bought, stocked, and installed as a unit. Installation cost is greatly reduced because there is no additional exterior or interior apparatus to be installed.

3 *Three-Point Protection*

can be given to old transformer installations to make them surge-proof by a new method of connecting Autovalve Lightning Arresters. This connection limits to safe values the voltage stresses that can exist between the high-voltage and low-voltage windings and between these windings and the case.

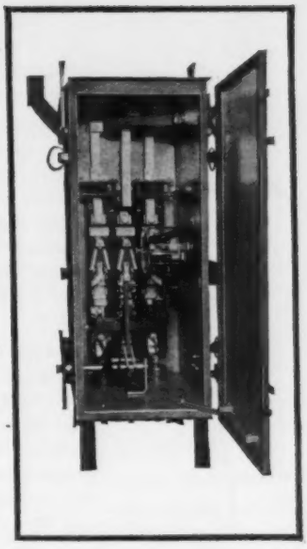
4 *Surge Generators*



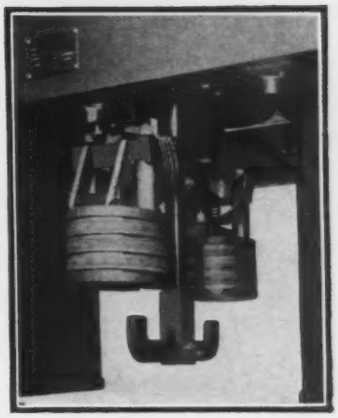
have been developed to make tests for weak spots in system insulation, thus to determine when and where re-insulation is needed to prevent breakdowns and outages caused by surges.

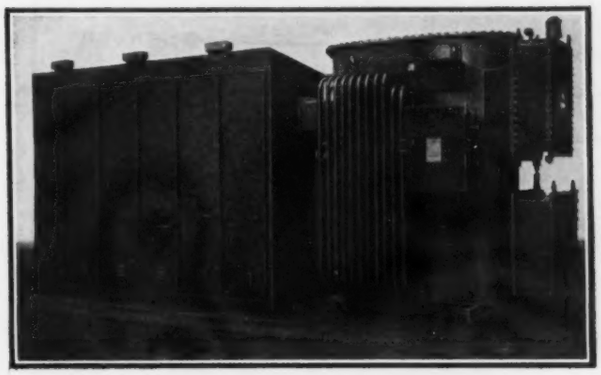
for Hard-Earned Dollars

5 ***The Light Duty Network Protector*** makes it possible to extend the economies of the a-c. network system to low-density load areas adjacent to downtown underground fed districts. Small size, light weight, and low cost adapt it particularly to light-duty service on poles, or in apartment houses and factories.



7 ***"De-ion Grids"*** installed on old Westinghouse oil breakers, indoor or outdoor, operating on circuits which tax their interrupting ability, give these breakers many years of additional service. This offers the most economical method of improving system stability. Also, it effects substantial savings in maintenance costs, because "De-ion Grids" eliminate the need for oil inspection and filtration after operation on short circuit.





6 ***The Primary Distribution Unit*** effects substantial reductions in substation costs for either primary networks or radial systems. Expensive buildings are not needed. Compactness saves space, and factory assembly saves time in installation.

These are some of the many recent Westinghouse developments that offer the Central Station Industry substantial savings in power distribution costs. They deserve your serious consideration.

For detailed information on any of this equipment, simply mail the coupon.

SEND FOR INFORMATION

Westinghouse Electric & Manufacturing Company
Room 2-N—East Pittsburgh, Pa.

Gentlemen: Please send me the booklet, or booklets, I have checked.

- ☐ C. 1960—A New Metering System
- ☐ L. 20560—Portable Stroboscopic Meter Standard
- ☐ L. 20561—OC Detachable Watthour Meter
- ☐ C. 1956—Nofuze Load Center
- ☐ C. 1938—OC Watthour Meter
- ☐ F. 8248—Surge-Proof Distribution Transformer
- ☐ C. 1944—Overhead Network Protector
- ☐ C. 1940—Primary Distribution Units
- ☐ C. 1933—Surge Protection
- ☐ L. 20523—"De-ion Grids" for Oil Circuit Breakers

Name .....

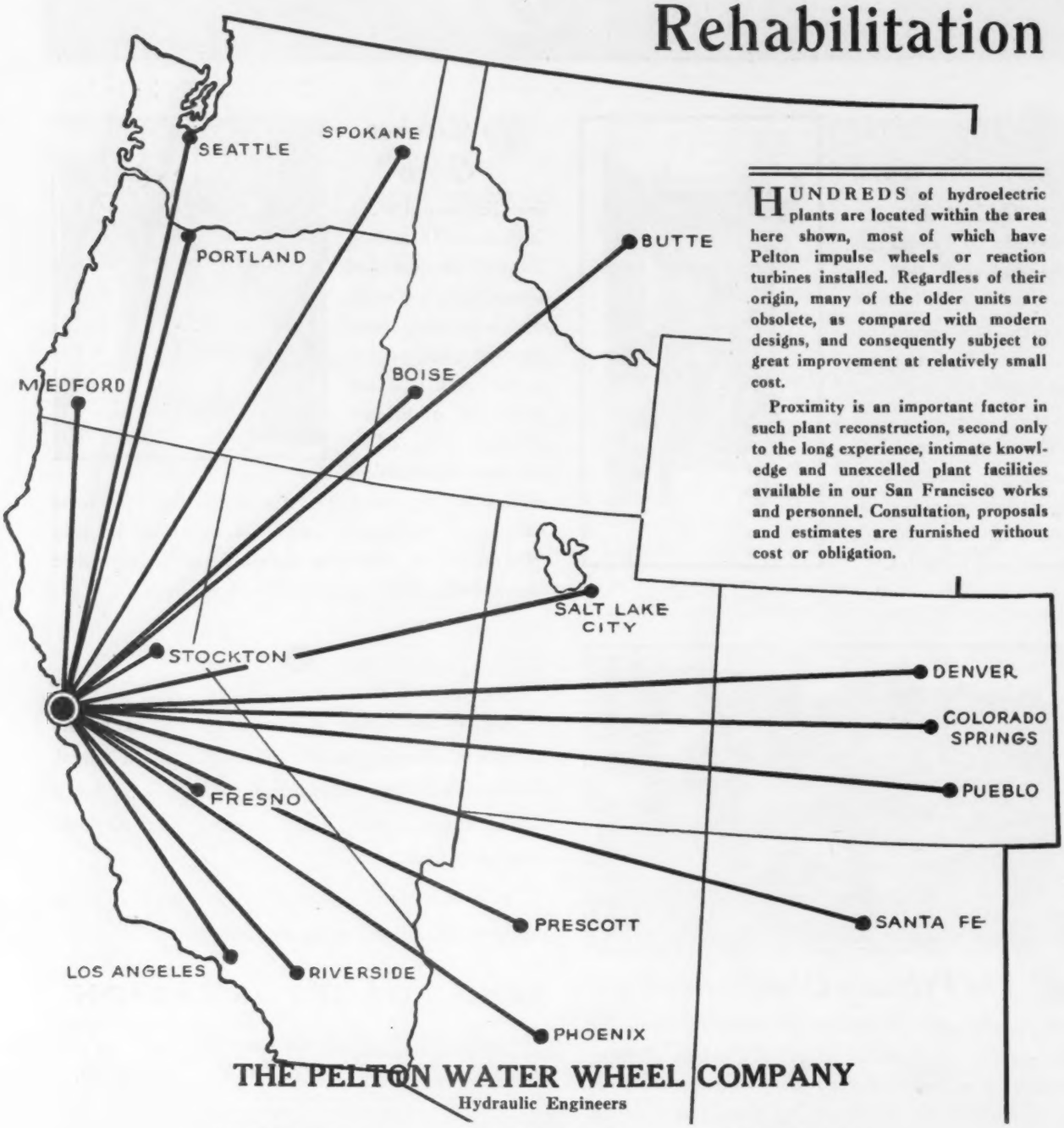
Company .....

Address ..... T 79448

City ..... *State* ..... EW 4-33

Westinghouse

Proximity Saves Time and Money in Hydro Plant Rehabilitation



HUNDREDS of hydroelectric plants are located within the area here shown, most of which have Pelton impulse wheels or reaction turbines installed. Regardless of their origin, many of the older units are obsolete, as compared with modern designs, and consequently subject to great improvement at relatively small cost.

Proximity is an important factor in such plant reconstruction, second only to the long experience, intimate knowledge and unexcelled plant facilities available in our San Francisco works and personnel. Consultation, proposals and estimates are furnished without cost or obligation.

THE PELTON WATER WHEEL COMPANY
Hydraulic Engineers

120 Broadway, NEW YORK
2929 Nineteenth St., SAN FRANCISCO
Paschall Station, PHILADELPHIA

Pacific Coast Representatives for BALDWIN-SOUTHWARK CORPORATION, DELAVERGNE ENGINE CO., and LARNER ENGINEERING CO., of Philadelphia, Pa.

PELTON

SEATTLE ART MUSEUM, SEATTLE, WASH.
Architects: Bebb & Gould, Seattle; Consulting Engineer: Lincoln Bouillon, Seattle; Electrical Contractors: NePage McKenny Co., Seattle. Approximately 7000 feet of Steeltubes installed.

ANOTHER CONVERT *to* STEELTUBES

AFTER completing the electrical installation in the new Seattle Art Museum, NePage McKenny Co., well known Pacific Coast Engineers and Contractors wrote: "We used Steeltubes and found that it worked very satisfactorily."

Contractors everywhere are having the same experience on every type of work. They are finding that Steeltubes affords the same degree of mechanical and electrical protection as the old-style threaded rigid conduit—that bending and cutting are easier—that no threading is required—that fewer tools are needed—that only three simple fittings adapt it to any job—that a material saving in installation costs is reflected in the profit figures.

Steeltubes is recognized as the modern threadless rigid conduit. Sales records prove its wide acceptance—more than 30,000,000 feet installed since its advantages were first made known to the electrical trade. It has been given broad code and Government approval.

The sooner you try Steeltubes the sooner you, too, will become a convert to the continued use of this most economical form of circuit protection. Stocked by electrical supply houses in all distribution centers.

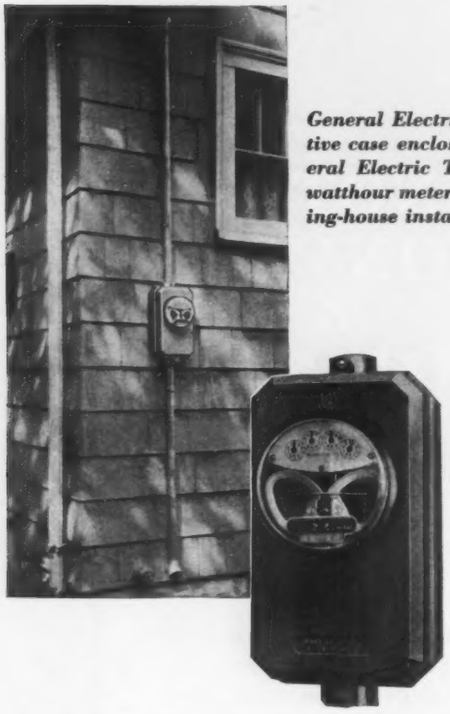
Complete information sent upon request.

THE MODERN THREADLESS RIGID CONDUIT
Steeltubes

Electrical Division
STEEL AND TUBES, INCORPORATED
World's Largest Producer of Electrically Welded Tubing
CLEVELAND » » « « OHIO
A UNIT OF REPUBLIC STEEL CORPORATION

Protection

for your revenues as well as your meters



General Electric protective case enclosing General Electric Type I-16 watthour meter in dwelling-house installation.

IN addition to providing years of protection for your watthour meters against the most adverse weather conditions, General Electric's new protective case makes access to the meter impossible without leaving positive evidence.

The case is die-cast of noncorrodible aluminum alloy, which excels in strength and durability. If desired, the case can be equipped with a special sealing screw, and with a glass seal which it is practically impossible to duplicate. The space between the meter cover and the box cover is tightly sealed against the entrance of moisture, by a thick rubber gasket which is under compression when the case is closed.

Ask for Bulletin GEA-1243B. General Electric Company, Schenectady, N. Y.

600-46

GENERAL ELECTRIC

LAST CALL

To be withdrawn soon

Special Introductory
$6.00 Price Offer

STANDARD HANDBOOK FOR ELECTRICAL ENGINEERS

Regular price to be $7.00

HERE is your last opportunity to get the new edition of the Standard Handbook at the special introductory price of $6.00. (About 15 per cent less than the regular price.)

Many engineers have taken advantage of this offer already. The first printing of 5,000 Handbooks is nearly exhausted.

Within a short time after this announcement appears the second printing will go to press and then this special offer must be withdrawn and the regular price of $7.00 put into effect.

New 6th Edition

Prepared by a staff of 91 specialists under the editorship of Frank F. Fowle, Consulting Engineer. 2816 pages, 4½ x 7, profusely illustrated.

— every section revised
— many sections rewritten
— whole sections added
— much new material
— more contributors
— new features of make-up

"Whether he be a welding engineer, meter engineer, electronic engineer, railway electrical engineer or general practitioner in power fields, he will again find that the Standard Handbook contains the indispensable condensation of working data which he needs at his finger tips."
—Electrical World.

"The new issue is a fine piece of work and is more extensive than any other similar volume on the market."
—C.C.S., Cherrydale, Va.

"Am very much pleased with the new issue . . . a masterpiece of art."
—W.A.H., Swannanda, N.C.

"The new book will be a great aid to me."
—M.B.M., Syracuse, N.Y.

Get this saving— Send your order now

Under this offer you pay the same price at which the Handbook sold 15 to 20 years ago, but you get the new Sixth Edition, the biggest in the history of the Standard—a monumental revision that is almost three-quarters new in subject matter.

So great was the revision and enlargement of this new edition that at first it was planned to issue the book in two volumes at $10.00. Then it was decided to keep it in one volume, adding new features of make-up, at $7.00

But you do not need to pay even this $7.00 price. If you send your order promptly, before this offer expires, the price is only $6.00, a cash saving of $1.00.

10 DAYS' FREE EXAMINATION

All orders mailed before the introductory price offer is withdrawn will be filled at the special price. After you receive your copy of the Standard you have 10 days in which to examine it. Then return it or send us only $6.00. But you must act soon. Only a comparatively small number of copies of the first printing remain. Make sure of getting yours at the reduced price.

Send the coupon now

McGRAW HILL FREE EXAMINATION COUPON

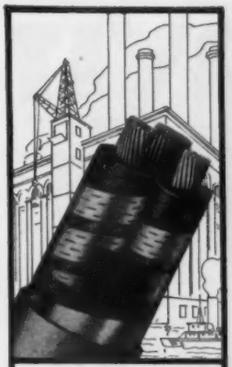
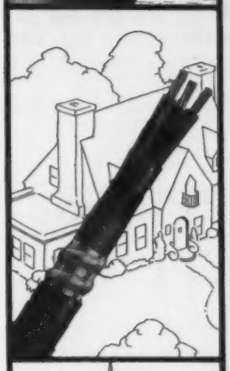
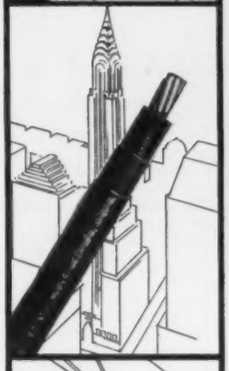
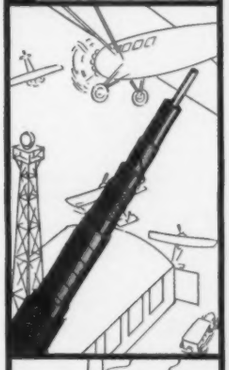
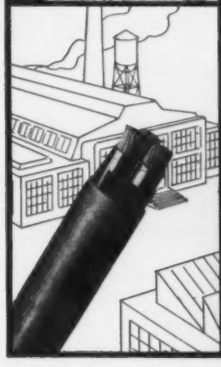
McGraw-Hill Book Co., Inc., 330 W. 42nd St., N. Y. C.
Send me the new sixth edition Standard Handbook for Electrical Engineers, for 10 days' free examination. Within 10 days of receipt I will return the book or send you the special introductory price of $6.00. (This offer limited.))

Name .....

Address ..... Position .....

City and State ..... Company .....

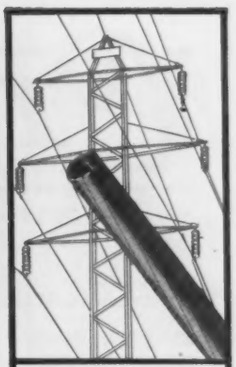
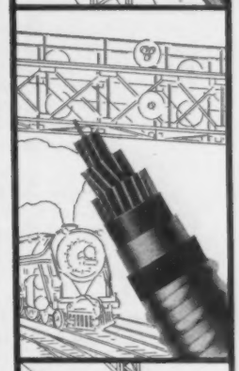
(Books sent on approval in U.S. and Canada only.) O.4-33

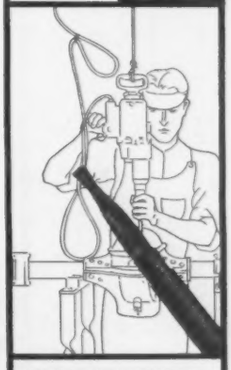
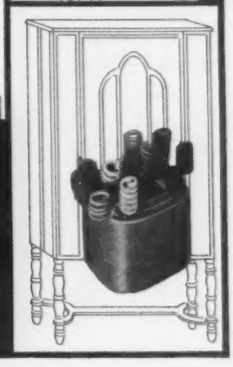






Rewire for Increased Load

ARMORED SERVICE ENTRANCE CABLE

Cuts installation costs and should broaden your sale of load building appliances . . . . .

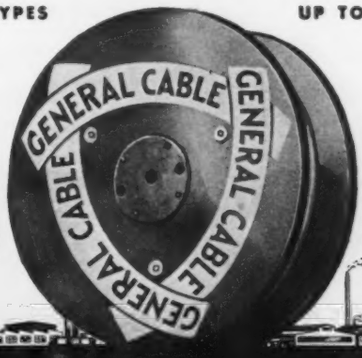



BARE AND INSULATED CONDUCTORS FOR TRANSMISSION AND DISTRIBUTION

Paper • Rubber • Varnished Cambric

ALL SIZES AND TYPES — UP TO 220,000 VOLTS

A STANDARD OF QUALITY



FOR OVER HALF A CENTURY

GENERAL CABLE CORPORATION

420 LEXINGTON AVENUE NEW YORK CITY

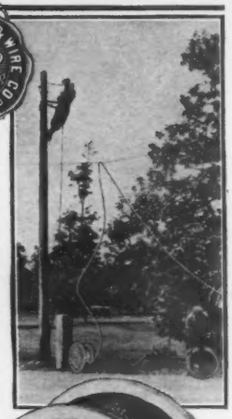
OFFICES IN PRINCIPAL CITIES

Crapo
GALVANIZED PRODUCTS

Seven Wire Steel Strand

• • • •

Telephone and Telegraph Wire



EXTEND the time of replacement... reduce maintenance costs ...by specifying *Crapo* Galvanized Products on all new and repair work! They combine every factor essential to long life and reduced expense: *pure* zinc coatings that neither crack nor peel, correct tensile values, proper ductility.

Insist upon genuine *Crapo* Galvanized Wire and Steel Strand! Representative Jobbers in all leading distributing centers can supply your needs immediately.

Indiana Steel & Wire Co.
Muncie, Indiana

BURNDY **SERVIT**

PAT. AUG. 23, 1932

the strongest service tap now made of *DURIUM*

WRITE

SEATTLE
DENVER
LOS ANGELES
SAN FRANCISCO

BURNDY
ENGINEERING CO. INC
308 EAST 45TH STREET - NEW YORK

FILING SUPPLIES
OFFICE SUPPLIES

Electrical West is from the press of Neal, Stratford & Kerr

NEAL, STRATFORD & KERR

STATIONERS -:- PRINTERS -:- ENGRAVERS

San Francisco: 521 Market St. Oakland: 1629 Telegraph Ave.

Now Available!

Ninth Edition of the BONBRIGHT SURVEY of Electric Light and Power Companies

What it is:

This great survey gives the first complete picture of the industry for the year—a nationally accepted reference.

How used:

Manufacturers of anything sold to or through central stations use it to analyze their prospects and plan sales work for most *effective results.*

Electric light and power company executives use it to visualize extensions to their properties and keep informed on the activity of other companies.

Investment houses and banks use it to present a complete, concise picture of the extensive interests of any power company to those interested in the purchase of utility securities. Capitalization and earnings are given, too.

Insurance companies, investment trusts and others use it for investment and analysis purposes.

It contains:

1. A map and table, for each State, picturing electric utility holdings.
2. Name and location of communities served by holding company subsidiaries.
3. Name and location of local companies.
4. Location of municipal light plants.
5. Source of energy purchased by municipals and local companies.
6. Financial reports.
7. Capitalization and earnings.
8. List of holding corporations and their subsidiary and affiliated companies.
9. List of management and supervisory corporations, and the properties they serve.
10. An index of operating and holding companies.
11. Summary of outstanding statistics of the industry, including expenditures, generator capacity, energy disposition, number of customers and employees.
12. Population and growth of all urban communities. Based on 1930 census.
13. Recent data on each State's products.

How it looks:

190 pages. Size 8½ x 11 inches—Printed on white enameled paper—Bound in durable blue stock—Cover printed in gold—Information grouped in geographical sections—Fully indexed. Price, 10 dollars, postpaid.

Compiled and distributed by
ELECTRICAL WORLD, 330 West 42d St., New York, N. Y.

THE MANUFACTURERS' DIRECTORY

¶ In these pages is a directory of electrical manufacturers, their Western offices and Western representatives—a valuable source of buying information to the subscribers of ELECTRICAL WEST. It is as accurate and complete as the publishers could make it; no charge is made for a listing and every manufacturer operating in this territory is privileged to be included. ELECTRICAL WEST does not guarantee the information, however, and assumes no responsibility for errors or omissions. Subscribers are respectfully requested to notify the publishers of any corrections or additions that should be made.

¶ Under each manufacturer are listed the Western branch offices or representatives. Where such information is not listed, the manufacturer has no representation in the territory or has reported none. If the distribution of a product is through jobbers only, this also is indicated. To use the directory, find the manufacturer's listing and call upon the nearest branch office or agent. If the name of the manufacturer is not known, turn to the "Where to Buy It in the West" guide immediately following and look under the name of the product in which you are interested.

A-A ELEC. MFG. CO., THE, Bridgeport, Conn.—Alexander W. Bromberg, Los Angeles.

ABOLITE REFLECTOR CO., West Lafayette, O.—Jos. Paulson, Portland; Myers & Schwartz, San Francisco; W. E. Welborne, Los Angeles; W. E. Young, Denver.

AIR PREHEATER CORP., THE, Wellsville, N. Y.—R. E. Chase & Co., Tacoma; Fred W. Kolb, San Francisco; Sutor & Co., Los Angeles; W. Z Harrison & Co., Salt Lake City.

AIRWAY ELECTRIC APPLIANCE CORP., Toledo, Ohio.—Montgomery Bros., Seattle, San Francisco, Los Angeles.

ALLEN CO., INC., L. B., Chicago, Ill.—H. B. Squires Co., San Francisco, Los Angeles, Seattle.

ALLIANCE MFG. CO., Allianee, O.—Gillan Sales Co., San Francisco, Los Angeles.

ALLEN BRADLEY CO., Milwaukee, Wis.—Garland-Affolter Eng. Corp., Seattle, San Francisco, Los Angeles; Peterson Co., Denver.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.—District Offices: Seattle, Portland, San Francisco, Los Angeles, Denver, Phoenix, Salt Lake City.

ALLIS CO., THE LOUIS, Milwaukee, Wis.—Sterling Elec. Motors, Inc., Los Angeles; O. H. Davidson Equip. Co., Los Angeles.

ALLOVER MFG. CO., Racine, Wis.—Kemp Cutlery Co., Portland.

ALL-STEEL-EQUIP. CO., Aurora, Ill.—I. P. Bean, Seattle; Thos. D. Noble Co., San Francisco; W. S. Sweet, Los Angeles.

ALTORFER BROS. CO., Peoria, Ill.—E. P. Becker, Pacific Coast Mgr., Los Angeles. Jobbers.

ALUMINUM CO. OF AMERICA, Pittsburgh, Pa. — Branch offices: San Francisco, Los Angeles.

AMERICAN BLOWER CORP., Detroit, Mich.—Branch Offices: Seattle, Tacoma, Portland, San Francisco, Los Angeles, Salt Lake City, Denver.

AMERICAN BRAIDING CO., Holyoke, Mass.—Keeler White Co., San Francisco.

AMERICAN CIRCULAR LOOM CO., INC., New York City—C. R. Dederick, Portland,; Utilities Supply Co., Los Angeles; Paul A. Douden, Denver.

AMERICAN ELECTRIC SWITCH CORP., THE, Minerva, O.— Irving P. Bean, Seattle; Thos. D. Noble Co., San Francisco; Alexander W. Bromberg, Los Angeles; Laughlin Sales Co., Denver.

AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind.—Fred W. Carlson, Seattle; E. I. Rodgers, San Francisco; R. H. Maples, Los Angeles.

AMERICAN CROSSARM & CONDUIT CO., Chicago, Ill.—Tidewater Crossarm & Conduit Co., H. B. Pearne, Western Dist. Mgr., Chehalis, Tacoma.

AMERICAN LAFRANCE & FOAMITE IND., INC., Elmira, N. Y.—Branch Offices: Seattle, Los Angeles, Denver, Houston.

AMERICAN STEEL & WIRE CO., Chicago, Ill.—Columbia Steel Co., Seattle, Portland, San Francisco, Los Angeles.

AMERICAN TRANSFORMER CO., Newark, N. J.—James H. Southard, San Francisco.

American Transformer Co.
178 Emmett Street
Newark, N. J.
Industrial Transformers
Testing Sets
California Representative
JAMES H. SOUTHARD
San Francisco, Calif.

ANACONDA WIRE & CABLE COMPANY, New York, N. Y.—Branch Offices: Seattle, San Francisco, Los Angeles.

ANCHOR WEBBING CO., Pawtucket, R.I.—Marwood, Ltd., Seattle, Portland, San Francisco, Los Angeles.

APEX ROTAREX MFG. CO., Oakland, Calif.—Branch Offices: Seattle, Portland, San Francisco, Fresno, Los Angeles, Maywood.

APPLETON ELECTRIC CO., Chicago, Ill.—Branch Offices: San Francisco, Los Angeles.

Additional Information

Further information regarding any manufacturer or representative here listed may be secured from

ELECTRICAL WEST
883 Mission St.
San Francisco, Calif.

ARROW ELECTRIC DIV., Hartford, Conn.—Branch Offices: Seattle, San Francisco, Los Angeles.

ART METAL CO., THE, Cleveland, O.—Baker Smith Company, Seattle, San Francisco, Los Angeles, Denver.

ATLAS LEATHER CO., Caseyville, Ill.—Andrews Equipment Service, Portland; Globe Electric Works, San Francisco; Hurt Conveyor Co., Los Angeles.

AUSTIN CO., THE M. B., Chicago, Ill.—The J. G. Pomeroy Co., San Francisco, Los Angeles.

AUTH ELECTRICAL SPECIALTY CO., INC., New York City.—Robinson Sales Co., Seattle, Portland; Thos. D. Noble, San Francisco; Electric Sales Co., Los Angeles; Nesco Co., Denver; J. A. Dupree, San Antonio.

AUTOMATIC ELECTRIC HEATER CO, INC., Pottstown, Pa.—Clyde L. Chamblin, San Francisco.

AUTOMATIC WASHER CO., Newton, Ia.—C. J. Reid, Branch Mgr., Los Angeles.

AUTOVENT FAN & BLOWER CO., Chicago, Ill.—S. W. R. Dally, Seattle; Clark Keeler, San Francisco; J. E. Dwan, Inc., Los Angeles; A. Wallace & Co., Denver; Inter-State Equipment & Supply Co., Salt Lake City.

BAILEY METER CO., Cleveland, O.—Branch Offices: Seattle, San Francisco, Denver, Houston.

BARKELEW ELECTRIC MFG. C., Middletown, O.—Electrical Specialty Co., Seattle, San Francisco, Los Angeles.

BARLOW & SEELIG MFG. CO., Ripon, Wis.—H. S. Labisky, Pacific Coast Mgr., Seattle; H. W. Randall, Oakland; R. D. Wood, Long Beach; Geo. A. Lowe, Co., Ogden.

BEARDSLEY & WOLCOTT MFG. CO,. Waterbury, Conn.—Eckert-Lloyd Corp., Portland, San Francisco, Los Angeles; Lauglin Sales Co., Denver.

BEAVER MFG. CO., Newark, N. J.—W. M. Clark, Portland; Electrical Specialty Co., San Francisco; Walter J. Sweet, Los Angeles; Lauglin Sales Co., Denver.

AQUAHOT
WATER HEATER
$40-list
Full Automatic-
Cork Insulated

Ideal for installation where intermittent moderate quantities of hot water are required. ¶ Fills need of Beer and Refreshment Parlors—Stores—Warehouses—Rest Rooms—Barber Shops—Gasoline Stations—Summer Cottages. ¶ Easy to install—Inexpensive operation—Underwriters' Approved. 3-Gal.—1000-Watts 110 or 220-volt. Ht. 24"; diam., 12". Fully Guaranteed.

CLYDE L. CHAMBLIN CO.
639 Mission St., San Francisco

BELDEN MFG. CO., Chicago, Ill.—Wallace R. Lynn Co., San Francisco.

BENJAMIN ELEC. MFG. CO., Des Plaines, Ill.—Miles F. Steel, Dist. Sales Mgr., San Francisco; M. L. Fowler, Seattle; T. F. McDonough, San Gabriel; Raymond Ackerman, Salt Lake City.

BIDDLE, JAMES G., Philadelphia, Pa.—Quality Elec. Co., Los Angeles.

BINGHAMTON FLEXIBLE SHAFT CO., Johnson City, N. Y.—W. J. McRae, San Francisco.

BIRTMAN ELEC. Co., Chicago, Ill.—The Gute Co., Ltd., San Francisco, Los Angeles.

BLACKBURN SPECIALTY CO., Cleveland, O.—H. B. Squires Co., Seattle, San Francisco, Los Angeles.

BOND ELECTRIC CORP., Jersey City, N. J.—A. Hipsham, Branch Mgr., San Francisco.

W. D. Howze Sales Co.
Representing
Bowie Switch Co.
Chance Wej-Lock Co.
Anchors and Guying Fixtures
Palnut Company—Locknuts
Manufacturers of
"HIGH VOLTAGE" Signs
Durable . . . No paint . . . Non-rusting . . . No radio interference
333 West 2nd Street
LOS ANGELES, CALIF.

BOWIE SWITCH CO., San Francisco, Calif.—Thomas S. Wood, Seattle; H. T. Whitehouse, Spokane; R. M. Small, San Francisco; W. D. Howze, Los Angeles; Paul A. Douden & Co., Denver.

BRACH MFG. CORP., L. S., Newark, N. J.—Don Burcham, Portland; J. P. Hermans, San Francisco; Strassner, Conrad R. & Co., Los Angeles; Electric Sales Co., Denver.

BRIGHT STAR BATTERY Co., Hoboken, N. J.—Branch Offices: San Francisco, Houston.

BRISTOL CO., THE, Waterbury, Conn.—Branch Offices: San Francisco, S. W. Case, Dist. Mgr.; Los Angeles.

BROWN-BROCKMEYER CO., INC., Dayton, O.—Branch Offices: Portland, San Francisco.

BROWN INSTRUMENT CO., Philadelphia Pa.—Branch Offices: San Francisco, Los Angeles, Denver, Salt Lake City.

BRYANT ELECTRIC CO., Bridgeport, Conn.—H. E. Sanderson, Branch Mgr., San Francisco.

BUCKINGHAM, W. H., Binghamton, N. Y.—Western Hardware & Tool C., Sacramento, San Francisco.

BUFFALO FORGE CO., Buffalo, N. Y.—Branch Offices: Seattle, San Francisco, Los Angeles, Denver, Salt Lake City.

BULLARD CO., E. D., San Francisco, Calif.

BURGESS BATTERY CO., Freeport, Ill.—George W. Harrower, Seattle; V. T. Rupp, San Francisco.

BURKE ELECTRIC CO., Erie, Pa.—Oliver B. Lyman, San Francisco; The Demmert Co., Los Angeles.

BURNDY ENGINEERING CO., INC., New York City—F. W. Carlson, Seattle; Burndy Eng'g Co., San Francisco; L. W. Thompson, Los Angeles; Peterson Co., Denver.

BURNLEY BATTERY & MFG. CO., North East, Pa.—Joslyn Co. of Calif., San Francisco, Los Angeles.

BUSSMAN MFG. CO., St. Louis, Mo.—A. J. Cole, Pacific Coast Mgr., Glendale, Calif. Branch Offices: Portland, San Francisco, Los Angeles, Denver.

CALIFORNIA CORRUGATED CULVERT CO., Berkeley and Los Angeles, Calif.—Spokane Culvert & Tank Co., Spokane; Pure Iron Culvert Mfg. Co., Portland; R. Hardesty Mfg. Co., Salt Lake City, Boise, Missoula, Denver; Western Metal Mfg. Co., El Paso, Dallas, Houston, San Antonio.

CALIFORNIA FRUIT GROWERS EXCHANGE, Chicago, Ill.—H. Leonhard, Pac. Coast Repr., Los Angeles.

CALL, JOSEPH C.,Bancroft, Idaho.

CAMERON ELECTRICAL MFG. CO., INC., THE, Ansonia, Conn.—Marwood, Limited, San Francisco.

CARNEY & CO., B. J., Spokane, Wash.

CENTRAL TUBE CO., Pittsburgh, Pa.—F. A. Strohecker, Seattle; Noad & Nicholas, San Francisco; Richard R. F. Lehman, Los Angeles.

CENTURY ELECTRIC CO., St. Louis, Mo.—Branch Offices: Seattle, Spokane, San Francisco, Los Angeles, Salt Lake City.

CHANCE CO., Centralia, Mo.—W. D. Howze Sales Co., Los Angeles. Leading Jobbers.

CHASE-SHAWMUT CO., Newburyport, Mass.—Keeler, White Co., Seattle; San Francisco; Los Angeles.

CHICAGO DRYER CO., Chicago, Ill.—M. E. Hammond, San Francisco; E. R. Kuns Co., Inc., Los Angeles.

CHICAGO FLEXIBLE SHAFT CO., Chicago, Ill.—Major E. W. Moore, Los Angeles; C. R. Musladin, Seattle.

SANDOVAL
SALES COMPANY
557 Market St., San Francisco
KEarny 7010
No. California Distributors
"Sunbeam" Appliances
Apex Air and Water Heaters
Benjamin Ranges
Conover Dishwashers

CIRCLE F MFG. CO., Trenton, New Jersey—Gillette & McLaren, Inc., Seattle, Portland; Noad & Nicholas, San Francisco; J. J. Schaller Co., Los Angeles; Petersen Sales Co., Denver.

CLARK, JR. ELEC. CO., JAS., Louisville, Ky.—H. H. Hoffman, Seattle; Zonne Elec. Tool Co., Los Angeles.

CLARK CONTROLLER CO., THE, Cleveland, O.—Burton R. Stare, Seattle; Oliver B. Lyman, San Francisco; The Demmert Co., Los Angeles; Alex Hibbard, Inc., Denver.

CLAROSTAT MFG. CO., Inc., Brooklyn, N. Y.—L. B. Bryan, Seattle; W. I. Otis, San Francisco; J. J. Perlmuth, Los Angeles.

COLLYER INSULATED WIRE CO., Pawtucket, R. I.—Allied Industries, Inc., Seattle, Portland, San Francisco, Los Angeles.

COLT'S PATENT FIRE ARMS MFG. CO., Hartford, Conn.—H. B. Squires Co., Seattle, San Francisco, Los Angeles.

30 YEARS
Experience
Representing Leading Manufacturers of Quality Electrical Apparatus and Supplies
H. B. SQUIRES CO.
Sam Russell, Pres.
Seattle San Francisco
Los Angeles

COLUMBIA CABLE & ELECTRIC CO., New York City—Garnett Young & Co., Seattle, San Francisco, Los Angeles.

CONDENSER CORP. OF AMERICA, Jersey City, N. J.—J. G. Corrin, Los Angeles.

J. G. CORRIN
California-Arizona
Western Nevada
Agent for
Electrocon Corp.
Meter Devices Co.
The White Rubber Co.
Penn-Union Electric Corp.
Hi-Voltage Equipment Co.
Condenser Corp. of America
Pennsylvania Transformer Co.
140 N. Sycamore Ave.
Los Angeles

CONDIT ELECTRIC MFG. CORP., Boston, Mass.—T. S. Wood, Seattle; H. B. Squires Co., San Francisco; Allis-Chalmers Mfg. Co., Los Angeles; Tinling & Powell, Spokane.

CONSOLIDATED LAMP & GLASS CO., Coraopolis, Pa.—Western Glass Products Co., Seattle, San Francisco, Los Angeles; F. W. Loomis, Los Angeles.

CONTINENTAL-DIAMOND FIBRE CO., Newark, Delaware—Marwood Limited, Seattle, Portland, San Francisco; Farnham & Cunningham, Los Angeles.

COOK PORCELAIN INSULATOR CORP., Cambridge, O.—Fred W. Carlson, Seattle.

COPPERWELD STEEL COMPANY, Glassport, Penna.—C. E. Ingalls, San Francisco.

C. E. INGALLS
Factory Representative
403 RIALTO BLDG.
SAN FRANCISCO

CORNING GLASS WORKS, Corning, N. Y.—Thomas S. Wood, Seattle; N. W. Paterson, San Francisco; W. W. Kirk, Los Angeles; J. E. Redmond, Phoenix; The Galigher Co., Salt Lake City; J. Q. Lalor, Denver.

COUCH CO., S. H. North Quincy, Mass.—Sierra Equip. Corp., Los Angeles, San Francisco.

CRAMER CO., R. W., New York City—Edw. H. Bell, Los Angeles; Maydwell & Hartzell, Inc., San Francisco.

R. W. Cramer & Co.
New York
SAUTER
TIME SWITCHES
Maydwell & Hartzell
San Francisco
E. H. Bell, Los Angeles

CRANE CO., Chicago, Ill.—Branch houses in all leading Western cities.

CRESCENT INS. WIRE & CABLE CO., Trenton, N. J.—Albert S. Knight Co., Seattle; Henger-Seltzer Co., Los Angeles, San Francisco.

CURTIS LIGHTING, INC., Chicago, Ill.—Western Offices: Seattle, San Francisco, Los Angeles, Denver.

CUTLER-HAMMER, INC., Milwaukee, Wis.—F. H. Oberschmidt, Pac. Coast Dist. Mgr., San Francisco. Branch Offices: Los Angeles, Seattle.

DAMPNEY CO. OF AMERICA, The, Boston, Mass.—C. C. Moore & Co. Engineers, Seattle, Portland, San Francisco, Los Angeles, Salt Lake City, Phoenix; Joy & Cox, Denver; Thomas Skinner & Son, Ltd., Vancouver, B. C.

DAVIS-JONES INSULATED WIRE CO., Pawtucket, R. I.—Electric Sales Co., Los Angeles.

DAY-BRITE REFLECTOR CO., St. Louis, Mo.—Allied Industries, Seattle; L. S. Foley, Portland; J. Landman, San Francisco; Illuminating Co., Los Angeles; The Wesco Co., Denver.

DE BOTHEZAT IMPELLER CO., INC., New York, N. Y.—R. E. Chase & Co., Inc., Seattle; C. R. Hunt, San Francisco; Alden P. Sprague, Los Angeles.

DeLAVAL SEPARATOR CO., THE, New York City—DeLaval Pacific Co., San Francisco.

DE LAVAL STEAM TURBINE CO., Trenton, N. J.—Branch Offices: Seattle, San Francisco, Los Angeles; Brisbane & Co., Denver; C. F. Farmer, Helena; Salt Lake Hdwe. Co., Salt Lake City; H. A. Paine Co., Houston.

DELTA ELECTRIC CO., Marion, Ind.—W. R. Lynn Co., San Francisco, Los Angeles.

DELTA-STAR ELECTRIC CO., Chicago, Ill.—W. R. Hendrey Co., Seattle; W. W. Kirk, Los Angeles; L. Brandenburger, Salt Lake City.

Warehouse Stocks
Los Angeles, San Francisco
Delta-Star Electric Co.
Champion Switch Co.
Corning Glass Works
Ralco Mfg. Co.
Standard Transformer Co.
Portable Light Co.
Niagara Electric Improvement Corp.
W. W. Kirk
Los Angeles 415 Wall St.
San Francisco 193 Second St.

DIAMOND ELEC. MFG. CO., Los Angeles, Calif.—Branch Offices: Seattle, San Francisco, Denver; J. E. Redmond, Phoenix.

DIEHL MFG. CO., Elizabethport, New Jersey—Zinsmeyer, Inc., San Francisco, Los Angeles.

DOLPH CO., JOHN C., Newark, N. J.—Joslyn Co. of Calif., San Francisco, Los Angeles.

DOMESTIC INDUSTRIES, INC., Mansfield, O.—Wm. L. Kirkpatrick, Los Angeles.

DOMINION ELEC'L MFG. CO., Minneapolis, Minn.—Wm. P. Horn Co., San Francisco; J. R. Shipp, Los Angeles.

DONGAN ELEC. MFG. CO., Detroit, Mich. — Wagner-Peterson Corp., Seattle, Portland; Sierra Equip. Corp., San Francisco, Los Angeles; Utilities Supply Co., Los Angeles.

DOVER MFG. CO., THE, Dover, O.—Jobbers.

CRESCENT INSULATED WIRE & CABLE CO.
Insulated Copper Wires and Cable
HENGER-SELTZER CO.
San Francisco Los Angeles
Albert S. Knight Co., Seattle

DRENDELL - TRUMBULL ELEC. MFG. CO., San Francisco, Calif.—Electrical Jobbers.

DUMORE CO., THE, Racine, Wis.—Motors & Tools: R. T. Frank, Los Angeles; Appliances: Fred C. Wood, Portland; W. J. Koepke, San Francisco; Paul H. Owsley, Los Angeles; Jack L. Hursch & Co., Denver.

DUNCAN ELECTRIC MFG. CO., Lafayette, Ind.—George L. Hoffman, Portland; A. F. Blecksmith, Los Angeles.

DUPLEXALITE DIVISION-The Miller Co., Meriden, Conn.—John H. Maddox, San Francisco. Jobbers.

EAGLE ELECTRIC MFG. CO., INC., Brooklyn, N. Y.—C. J. Gratiot & Sons, San Francisco.

EAGLE ENGINEERING CO., Springfield, O.—H. J. Gute & Co., San Francisco.

EASTERN SPECIALTY CO., THE, Philadelphia, Pa.—J. G. Monahan, Los Angeles; J. E. Redmond, Phoenix.

EASY WASHING MACHINE CORP., Syracuse, N. Y.—F. S. Fenton, Jr., Branch Mgr., San Francisco.

ECHLIN & ECHLIN, INC., San Francisco, Calif.

ECONOMY ELECTRIC DEVICES CO., Chicago, Ill.—L. A. Nott & Co,. San Francisco.

EDISON GENERAL ELEC. APPLIANCE CO., INC., Chicago, Ill.—Branch Offices: Seattle, San Francisco, Los Angeles, Salt Lake City.

EDISON STORAGE BATTERY CO., West Orange, N. J.—Branch Offices: Seattle, San Francisco.

EDWARDS & CO., INC., New York, N. Y.—F. A. Strohecker, Seattle; Guy McGee, San Francisco; H. M. Pomeroy, Los Angeles; A. E. Bacon, Denver.

ELECTRIC CONTROLLER & MFG. CO., THE, Cleveland, O.—J. C. McDougall, Seattle; C. F. Henderson, San Francisco; Thomas Machinery Co., Los Angeles.

ELECTRIC FURNACE CO., THE, Salem, O.—C. F. Henderson, San Francisco; Thomas Machinery Co., Los Angeles.

ELECTRIC HEATER CORP., THE, Bridgeport, Conn.—Clyde L. Chamblin Co., San Francisco.

ELECTRIC MACHINERY MFG. CO., Minneapolis, Minn.—Branch Offices: Seattle, San Francisco, Los Angeles.

ELECTRIC POWER EQUIPMENT CORP., Philadelphia, Pa.—Eicher & Bratt, Seattle; C. E. Ingalls, San Francisco; J. Q. Lalor, Denver; The Galigher Co., Salt Lake City.

ELECTRIC PRODUCTS CO., THE, Cleveland, O.—H. M. Thomas Co., Ira G. Perin, San Francisco; L. W. Thompson, Los Angeles.

ELECTRIC SERVICE SUPPLIES CO., Philadelphia, Pa. — H. M. Euler, Portland; F. F. Bodler, Schleicher & Co., San Francisco; A. W. Arlin, Los Angeles; L. V. Wilson, Phoenix; B. A. Franklin, Denver; L. Brandenburger, Salt Lake City.

ELECTRIC SIGNAL CO., LTD., Los Angeles, Calif.—Sierra Equipment Corp., San Francisco, Los Angeles.

ELECTRIC STORAGE BATTERY CO., The, Philadelphia, Pa.—G. R. Murphy, Dist. Mgr., San Francisco; Branch Offices: Seattle, San Francisco, Los Angeles, Denver.

John C. Dolph Co.
Newark, N. J.
INSULATING VARNISHES and COMPOUNDS
Joslyn Company
San Francisco Los Angeles

ELECTRIC VACUUM CLEANER CO. INC., Cleveland, O.—Branch Offices: THE PREMIER VACUUM CLEANER CO., Portland, San Francisco, Los Angeles.

ELECTRICAL ENGINEERS EQUIPMENT CO., Melrose Park, Ill.—F. W. Carlson, Seattle; J. M. Cavanaugh, Portland; C. D. LaMoree, San Francisco, Los Angeles; O. H. Davidson, Denver.

ELECTRICAL FACILITIES, INC., Oakland, Calif.—Thomas S. Wood, Seattle; A. F. Blecksmith, Los Angeles.

Lighting for Every Purpose

CUSTOM BUILT LIGHTING

Consultants and suppliers of highest grade lighting equipment for exterior or interior of Theaters, Hotels, Office Buildings, Clubs and Better Class Homes.

Representing

Belson Manufacturing Co. Theater Lighting Equip.

General Controller Co. "Telechimes"

Electric Service Supplies Co. Floodlighting Equipment

SCHLEICHER & CO., INC.

79 McAllister St., San Francisco HEmlock 6180

ELECTROLINE CO., Chicago, Ill.—H. H. Manny Co., Seattle; A. J. Myers Co., San Francisco.

AUTOMATIC LINE SPLICES
SOLDERLESS TAP CONNECTORS
For better construction
Data from representatives
ELECTROLINE COMPANY
4121 S. LaSalle St., Chicago

ELECTROMASTER INC., Detroit, Mich.—Cronin Distributing Co., Portland; Fernand Pincoffs Co., Los Angeles; Western Supply Company, Salt Lake City.

ELECTROTRIM, INC., Union City, Ind.—C. R. Hunt, San Francisco.

EMERSON ELEC. MFG. CO., St. Louis, Mo.—Geo. S. Tivy, Jr., Factory Repr., Los Angeles. Leading Jobbers.

ESTATE STOVE CO., THE, Hamilton, O.—Branch Offices: Portland, Los Angeles, Salt Lake City.

ESTERLINE-ANGUS CO., Indianapolis, Ind.—A. H. Cox & Co., Seattle; George L. Hoffman, Portland; C. F. Henderson, San Francisco; Quality Electric Co., Los Angeles; J. E. Redmond Co., Phoenix.

ROCKWOOD Paper Pulleys
ESTERLINE-ANGUS
Graphic Instruments
J. G. BIDDLE Electrical Instruments
QUALITY ELECTRIC CO.
Los Angeles
812 S. San Pedro St.

EUREKA VACUUM CLEANER CO., Detroit, Mich. — Branch Offices: Seattle, Spokane, Portland, San Francisco, Los Angeles, Salt Lake City, Denver.

EVERSTICK ANCHOR CO., St. Louis, Mo.—Jobbers Supply Co., Seattle, Portland; Joslyn Co. of Calif., Los Angeles, San Francisco.

EV'RYDAY ELECTRIC CO., Marion, Ind.—Irving P. Bean, Seattle; E. J. A. Gardiner, San Francisco; J. W. Laycock, Los Angeles.

EXCEL MFG. CORP., Muncie, Ind.—Graybar Electric Co., Los Angeles.

FAIRBANKS, MORSE & CO., Chicago, Ill.—Branch Offices: Seattle, Portland, San Francisco, Los Angeles, Salt Lake City.

FELDMAN & CO., INC., J. M., Los Angeles, Calif.—Branch Office: San Francisco.

FIBRE CONDUIT CO., THE, Orangeburg, N. Y.—Johns-Manville, Corp., Seattle, Portland, San Francisco, Los Angeles, Salt Lake City.

FIRE PROOF WALL CO., Oakland, Calif.—W. R. Hendrey Co., Seattle; Indus. Engr. & Equip. Corp., Los Angeles.

FLOOROLA CORP., THE, York, Pa.—Commercial Soap & Chem. Co., San Francisco.

FOSTER LUMBER CO., E. A., Seattle, Wash.—H. H. Manny Co., Seattle; Maydwell & Hartzell, Inc., San Francisco; The O. H. Davidson Equipment Co., Denver.

FOSTER WHEELER CORP., New York City—Consolidated Steel Corp., Ltd., San Francisco.

FOUR WHEEL DRIVE SALES CO., Clintonville, Wis.—Branch Offices: San Francisco, Los Angeles.

FRALICK & CO., S. R., Chicago, Ill.—C. R. Dederick, Portland; J. J. Schaller Co., Los Angeles.

FRENCH BATTERY CO., Madison, Wis.—Snow Sales Co., Spokane; Wallace R. Lynn Co., San Francisco.

FRETZ-MOON TUBE CO., INC., Butler, Pa.—E. E. Buerkel, Burlingame; H. F. Boardman, Inc., Los Angeles.

FRIGIDAIRE CORP., Dayton, O.—R. G. Hutchison, Mgr., Pacific Coast Regional Office, San Francisco; Branch Offices: Portland, Oakland, Los Angeles; Distributors: Jensen-Byrd Co., Spokane; W. H. Bintz Co., Salt Lake City.

FRINK CORP., THE, Long Island City, N. Y.—James Mundstock, Branch Mgr., San Francisco. Agents: Western Bldg. Specialties Co., Seattle; R. M. Camnitz, Portland; Richard R. F. Lehman, Los Angeles; W. H. Schwade, Denver; Thad J. Stevens, Salt Lake City; J. E. Redmond Co., Phoenix.

G & W ELECTRIC SPECIALTY CO., Chicago, Ill.—W. R. Hendrey, Co., Seattle; C. E. Ingalls, San Francisco; Farnham & Cunningham, Los Angeles; Ambler & Riter, Salt Lake City; Mountain States Machinery Co., Denver.

GARLAND MFG. CO., Pittsburgh, Pa.—J. G. Pomeroy, Co., San Francisco; Los Angeles.

GARY STRUCTURAL STEEL CO., Gary, Ind.—H. B. Squires Co., San Francisco; Utilities Supply Co., Los Angeles.

G. C. A. MFG. CO., THE, Pittsfield, Mass.—H. H. Manny Co., Seattle; Joslyn Co. of Calif., Los Angeles. Jobbers.

GENERAL CABLE CORP., New York City—Branch Offices: Seattle, San Francisco, Los Angeles.

GENERAL ELECTRIC CO. (Mdse. Dept.) Bridgeport, Conn.—Branch Offices all principal cities.

GENERAL ELEC. CO., (Refrigeration & Range Divs.) Cleveland, O.—Geo. J. Ruck, Pac. Coast Mgr., San Francisco. Sales Offices: All principal cities.

GENERAL ELECTRIC CO., Schenectady, N. Y.—J. A. Cranston, Com'l Vice President, San Francisco. Sales Offices all principal cities.

GENERAL ELECTRIC VAPOR LAMP CO., Hoboken, N. J.—Keese Eng'g Co., San Francisco, Hollywood.

GENERAL REFRIGERATION SALES CO., Beloit, Wis.—Gray McLean & Percy, Seattle, Portland; Allied Industries, Inc., San Francisco; C. Sowers, Los Angeles.

GIBSON ELEC. REFRIGERATOR CORP., Greenville, Mich.—L. Taufenbach, Western Sales Mgr., Los Angeles. Jobbers.

GILBERT CO., A. C., New Haven, Conn.—F. A. Degnan, San Francisco.

GILFILLAN BROS., INC., Los Angeles, Calif.

GILL GLASS & FIXTURE CO., Philadelphia, Pa.—R. E. Baum, San Francisco.

GLOBAR CORP., Niagara Falls, N. Y.—Pacific Abrasive Supply Co., San Francisco, Los Angeles.

GOODRICH ELECTRIC CO., Chicago, Ill.—Keeler, White Co., Seattle; San Francisco; Los Angeles.

GREENE ELECTRIC FURNACE CO., Seattle, Wash.—

GUTH, THE EDWIN F. CO., St. Louis, Mo.—Branch Offices: San Francisco, Los Angeles.

HAAG BROS CO., Peoria, Ill.—Jobbers.

HAGAN CO., GEORGE J., Pittsburgh, Pa.—E. A. Wilcox Co., San Francisco.

HAMILTON BEACH MFG. CO., Racine, Wis.—Leading jobbers.

HANKSCRAFT COMPANY, Madison, Wis.—Erlach-Lee Company, San Francisco.

HART & HEGEMAN DIV., Hartford, Conn.—Garnett Young & Co., Seattle, San Francisco, Los Angeles.

HART MANUFACTURING COMPANY, Hartford, Conn.—Sierra Equipment Corp., Seattle, San Francisco, Los Angeles.

HASKINS CO., R. G., Chicago, Ill.—J. C. Fletcher, San Francisco; H. J. Zonne, Los Angeles.

"NICHROME"
made by
Driver-Harris Co.
Harrison, N. J.
West Coast Distributors
John A. Roebling's Sons Co.
San Francisco, Calif.

CAUTION!

ELECTRICAL WEST has tried to make this directory as complete and accurate as possible, but can assume no responsibility for errors. Corrections and additions are solicited.

HEINEMANN ELECTRIC CO., Trenton, N. J.—A. S. Knight Co., Seattle; Henger Seltzer Co., San Francisco, Los Angeles.

HEMINGRAY GLASS CO., Muncie, Ind.—Leading Jobbers.

HERWIG COMPANY, THE, Chicago, Ill.—Frazer & Co., Ltd., San Francisco.

HEXACON ELEC. APPLIANCE CORP., Roselle Park, N. J.—C. A. Pearson, San Francisco. Jobbers.

HIGHLAND ELECTRO CHEMICAL MFG. CO., Connellsville, Pa.—Leading Jobbers.

HI-VOLTAGE EQUIPMENT CO., Cleveland, O.—J. G. Corrin, Los Angeles; A. F. Krippner, Denver.

HOBART MFG. CO., THE, Troy, O.—Branch Offices: Seattle, Portland, Spokane, San Francisco, Oakland, Los Angeles, Denver, Phoenix, Salt Lake City, Twin Falls, El Paso.

HOLOPHANE CO., INC., New York City—Frank A. Hansen, Los Angeles; Robert G. Dummel, San Francisco.

HOMELITE CORP., Port Chester, N. Y.—A. H. Cox & Co., Seattle; Edw. R. Bacon Co., San Francisco; Concrete Mach'y & Supply Co., Los Angeles; Browning-Ferris Mach'y Co., Dallas.

HOOVER CO., THE, No. Clinton, O.—Hugh Murray, Branch Mfg., Los Angeles. Jobbers.

HOPE WEBBING COMPANY, Providence, R. I.—C. D. LaMoree, San Francisco, Los Angeles.

HORTON MFG. CO., Fort Wayne, Ind.—General Sales Corp., Seattle, Portland, San Francisco, Los Angeles.

HOSKINS MFG. CO., Detroit, Mich.—Pacific Machine & Tool Steel Co., Portland; E. A. Wilcox, San Francisco.

HOWZE SALES CO., W. D., Los Angeles, Calif.

HUBBARD AND CO., Pittsburgh, Pa.—W. W. Glosser, Pacific Coast Mgr., Oakland, Calif. Leading Jobbers.

HURLEY MACHINE CO., Chicago, Ill.—R. G. Chamberlain, Vice-Pres., Western Div., Seattle. Leading Jobbers.

IDEAL COMMUTATOR DRESSER CO., Sycamore, Ill.—J. E. Beggs, Seattle; Andra MacLean, Portland; F. F. Bodler, San Francisco; Quality Electric Co., Los Angeles; Industrial Supply Co., Salt Lake City; R. W. Burnett, Denver.

IDEAL ELECTRIC & MFG. CO., THE, Mansfield, O.—W. H. Stewart, Seattle; George Nixon, Spokane, Andra McLean, Portland; A. J. Myers, San Francisco; Lombard J. Smith, Los Angeles; George W. Hummel, Phoenix; J. Ludvig Hansen, Denver.

ILLINOIS ELEC. PORCELAIN CO., Macomb, Ill.—On Standard Porcelain: Jobbers Supply Co., Seattle; Joslyn Co. of Calif., San Francisco, Los Angeles; On High Tension Line: Wagner Peterson Corp., Seattle, Portland; L. W. Thompson, Los Angeles; Fred E. Staible, Inc., Denver; G. W. Hummel, Phoenix.

ILLINOIS ENGINEERING COMPANY, Chicago, Ill.—W. A. Hill, Seattle; J. W. Luke, Portland; J. I. Krueger, San Francisco; English & Lauer, Inc., Los Angeles; A. Wallace & Co., Denver; Manufacturers Sales & Service Co., Salt Lake City.

INCANDESCENT LAMP DEPT., GENERAL ELECTRIC CO., Cleveland, O.—Branch Offices: Seattle, Portland, San Francisco, Los Angeles.

INDIANA STEEL & WIRE CO., Muncie, Ind.—Graybar Electric Co., Inc., all principal cities.

INGERSOLL-RAND CO., New York City.—Branch Offices: Seattle, San Francisco, Los Angeles, Denver, El Paso, Salt Lake City, Butte.

INLAND GLASS WORKS, INC., Chicago, Ill.—Roy D. Myers, San Francisco; Thos. A. Esling, Los Angeles.

INTERNATIONAL CREOSOTING & CONSTRUCTION CO., Galveston,

Cooper-Hewitt Lights
GENERAL ELECTRIC
VAPOR LAMPS
KEESE ENGINEERING COMPANY
Represented by
LEO KAUFMAN
557 Market St.
San Francisco, Calif.
SUtter 5328
JOHN T. SHANNON
7380 Santa Monica Blvd.
Hollywood, Calif.
GRanite 1443

Garland - Affolter Engineering Corp.

California — Oregon — Washington and Arizona

Jeffery-Dewitt Insulator Co. **Allen-Bradley Co.**
Penn Electric Switch Co. **Moloney Electric Co.**
McDonnell & Miller

LOS ANGELES SAN FRANCISCO SEATTLE

Tex.—Graybar Elec. Co., Inc., all principal cities.

INTERNATIONAL GENERAL ELECTRIC CO., INC., New York City—W. C. North, Pac. Coast Mgr., San Francisco.

INTERSTATE ELECTRIC CO., St. Louis, Mo.—Consolidated Battery Co., Los Angeles; C. E. Brain, Glendale, Calif.; G. T. Ripley, Denver.

IRONRITE IRONER CO., THE, Detroit, Mich.—F. D. Ford, Seattle; F. H. McGinnis, Sacramento; Easy Housekeeping Shop, Los Angeles.

IVANHOE DIVISION of The Miller Co., Meriden, Conn.—General Electric Supply Co., all principal cities.

JANETTE MANUFACTURING CO., Chicago, Ill.—Janette Mfg. Co., Seattle; Lombard Smith Co., Los Angeles.

JEFFERSON ELEC. CO., Bellwood, Ill.—Glenn Shaver, Pac. Coast Sales Mgr., Los Angeles. Branch Offices: Seattle, San Francisco.

JEFFERY - DEWITT INSULATOR CO., Kenova, W. Va.,—Garland-Affolter Engr. Corp., Seattle, San Francisco, Los Angeles; Geo. D. Luther, Tucson; Herbert Wolcott, El Paso; L. Brandenburger, Salt Lake City.

JEFFRIES TRANSFORMER CO., Los Angeles, Calif.—Electric Agencies, Oakland.

JOHNS-MANVILLE CORP., New York City—Branch Offices: Seattle, San Francisco, Los Angeles.

JOHNSON & SON, INC., S. C., Racine, Wis.—Branch Offices: Seattle, San Francisco, Los Angeles, Denver.

JOSLYN CO. OF CALIF., Los Angeles, Calif.—Associated Wholesale Elec. Co., Los Angeles.

KEARNEY CORP., JAMES R., St. Louis, Mo.—Maydwell & Hartzell, Inc., San Francisco, Los Angeles; Graybar Elec. Co., Seattle, Portland, Spokane, Tacoma.

KELLEMS PRODUCTS INC., New York City—Farnham and Cunningham, Los Angeles.

KELMAN ELECTRIC & MFG. CO., Los Angeles, Calif.—Eicher & Bratt, Seattle; C. E. Ingalls, San Francisco.

KELVINATOR SALES CORP., Detroit, Mich.—District Offices: Seattle, Los Angeles, Denver.

KENT COMPANY, INC., THE, Rome, N. Y.—A. H. Cox & Co., Seattle; F. R. Crandall, Los Angeles.

KERITE INS. WIRE & CABLE CO., INC., New York City—J. P. Robinson, Branch Mgr., San Francisco.

KEYSTONE STEEL & WIRE CO., Peoria, Ill.—Maydell & Hartzell, Inc,. San Francisco, Los Angeles.

KILLARK ELECTRIC MFG. CO., St. Louis, Mo.—Allied Industries, Inc., Seattle, Portland, San Francisco; Electric Sales Co., Los Angeles.

KITCHENAID MFG. CO., THE, Troy, O.—Branch Office: San Francisco; District Sales Offices: Seattle, Portland, Los Angeles, Denver, Salt Lake City, Tucson.

KLIEGL BROS., New York City—C. W. Cole & Co., Inc., Los Angeles.

KORTICK MFG. CO., San Francisco, Calif.—H. H. Manny Co., Seattle; Maydwell & Hartzell, Inc., Los Angeles.

LAKE MFG. CO. INC., Oakland, Calif.—Sierra Equipment Corp., Seattle, San Francisco, Los Angeles.

LaMOREE, C. D., Los Angeles, Calif.

LANDIS & GYR, INC., New York City — Farnham & Cunningham, Los Angeles.

LAPP INSULATOR CO. INC., Le-Roy, N. Y.—H. H. Manny Co., Seattle; Maydwell & Hartzell, San Francisco, Los Angeles.

LEACH COMPANY, Oshkosh, Wis. —Leading Jobbers.

LE CARBONE COMPANY, Hoboken, N. J.—W. R. Catching, San Francisco.

LEEDS & NORTHRUP CO., Philadelphia, Pa.—Branch Offices: San Francisco, Los Angeles.

LELAND ELECTRIC CO., THE, Dayton, O.—Sterling Electric Co., Seattle, San Francisco, Oakland, Los Angeles; Wesco Company, Denver.

LENZ ELEC. MFG. CO., Chicago, Ill.—Merton A. Dobbin, Portland; Sierra Equip. Corp., San Francisco, Los Angeles; Frank A. Emmet Co., Alhambra.

LANDIS & GYR CO.
New York, N. Y.

TIME SWITCHES
METERS & COIN METERS

Farnham & Cunningham
Los Angeles

LEONARD REFRIGERATOR CO., Detroit, Mich.—Leading Jobbers.

LEVITON MFG. CO., Brooklyn, N. Y.—Branch Offices: San Francisco, Los Angeles.

LIBERTY MACHINE & POLE LINE CO., San Francisco, Calif. —Allied Industries, Inc., Seattle, Portland, Los Angeles.

Joslyn Company
of California

Manufacturers and Distributors of
Electrical Construction Materials

JOSLYN
HOT-GALVANIZED
POLE LINE HARDWARE

Manufactured in the West to meet Western needs

Representing

PINCO Insulators
EVERSTICK Anchors
MOHAWK Conduit
PLYMOUTH Insulating Tapes
BULLDOG Knobs, Insulators, Tubes, Cleats, etc.
DOLPH Insulating Varnish
PHILADELPHIA Magnet and Annunciator Wire
BURNLY Soldering Pastes
HYKON Boring Device
COLUMBUS Sturd E Tools
WESTERN Red Cedar Poles
Fir Cross Arms
Wood Pins and Brackets
Steel Strand

Factory — 5100 District Blvd. — LOS ANGELES
District Office — 175 Russ Bldg. — SAN FRANCISCO

Transformers for any Requirement

A COMPLETE LINE . . .
STANDARD OR SPECIAL

Dry Type transformers, 50 Watts to 10 Kva. . . .
Special oil cooled transformers up to 100 Kva.
Heavy duty signal and bell-ringing transformers
"Universal Automatic" Coils and coil service
Portable Air Cooled Transformer . . . 110-Volt lighting from 220 or 440-Volt power circuits

Repair Service for . . .

Distribution transformers—all makes and sizes
Auto-Starters and Starting-Compensators
Lifting Magnets . . . Solenoids of all types
Low voltage release coils
Overload relay coils
Constant current transformers
Battery chargers . . . Spot welders

JEFFRIES TRANSFORMER CO.
5706 Long Beach Avenue -:- Los Angeles, Calif.

In San Francisco Area
ELECTRIC AGENCIES, 2059 Webster St., Oakland

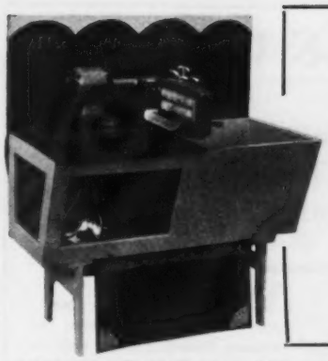
DEPENDABLE **JEFFRIES** TRANSFORMERS

Dick Russell Says:

We are distributors in So. Calif. of—
Joslyn Hardware and Specialties
Okonite and Hazard Wires and Cables
Alumaduct Conduit
The famous "Sunbeam" line of appliances
—and a lot of other good stuff

We manufacture and Distribute to the fair World—Neolite Units and Auto-Transformers, R & L Disconnecting Potheads, Spliceheads and Statites

Associated Wholesale Electric Co.
1111 Santee St. Los Angeles



LITTLE GIANT Tray Washer

The entering Sales Wedge—profitable in itself—through its saving of space and convenient operation, opens the door to ironer and refrigerator sales.

Join the family of enthusiastic Coast Dealers with the idea of making some good profits in . . . 1933.

LITTLE GIANT INC. LTD.
1001-24th St., Oakland, Calif.

LINCOLN METER CO., INC., Springfield, Ill.—Thomas S. Wood, Seattle; Sangamo Electric Co., San Francisco, Los Angeles, Phoenix; Mountain States Machinery Co., Denver.

LINDE AIR PRODUCTS CO., THE, —Branch Offices: Seattle, Spokane, San Francisco, Los Angeles, Denver, Salt Lake City.

LINDEMANN & HOVERSON CO., A. J., Milwaukee, Wis.—P. F. Ross, Branch Mgr., San Francisco.

LINE MATERIAL CO., So. Milwaukee, Wis.—Branch Offices: Seattle, Portland, Oakland, Denver, Phoenix.

LIONEL CORP., THE, New York, N. Y.—M. Sweyd, San Francisco.

LITTLE GIANT INC., LTD., Oakland, Calif.

LOCKE INSULATOR CORP., Baltimore, Md.—General Electric Supply Corp. All principal cities.

LOCUST PIN CO., Front Royal, Va.—Maydwell & Hartzell, Inc., Seattle, San Francisco, Los Angeles.

LEUPOLD VOLPEL & CO., Portland, Ore — Charles Moorhead, Vancouver, B. C.; Dieterich-Post Co., San Francisco, Los Angeles; Water Works Equipment Co., Salt Lake City.

McFADDIN & CO., INC., H. G., New York City—Leading Jobbers.

L. D. McFARLAND CO., Sandpoint, Ida.—Maydwell & Hartzell, Inc., San Francisco, Los Angeles; Hendrie & Bolthoff Mfg. & Supply Co., Denver.

McGILL MFG. CO., Valparaiso, Ind. —Frank A. Strohecker, Seattle; J. G. Pomeroy Co., San Francisco, Los Angeles; Fred E. Staible, Inc., Denver.

McGRAW ELEC. CO., Chicago, Ill. —A. J. Cole, Pac. Coast Mgr., Glendale, Calif.

McLAUGHLIN GLASS CO., Los Angeles Calif.—Maydwell & Hartzell, Inc., Seattle, San Francisco, Los Angeles.

MACALLEN CO., THE, S., Boston, Mass.—R. C. James Co., Seattle; C. D. LaMoree Co., San Francisco, Los Angeles.

MACBETH-EVANS GLASS CO., Charleroi, Pa.—Baker-Smith Co., Seattle, San Francisco, Los Angeles, Denver.

MALLEABLE IRON RANGE CO., Beaver Dam, Wis.—G. A. Lieser, Western Sales Mgr., Seattle; Branch Offices: Portland, Oakland.

MANNING BOWMAN & CO., Meriden, Conn.—Geo. H. Watson, Branch Mgr., San Francisco, Leading Jobbers.

MARBELITE CORP. OF AMERICA, LTD., Los Angeles, Calif.

MARTIN & SONS, H. P., Owensboro, Ky.—Leading Jobbers.

MARTINDALE ELECTRIC CO., THE, Cleveland, O.—Marwood, Ltd., Seattle, Portland, San Francisco, Los Angeles; Hendrie & Bolthoff Mfg. & Supply Co., Denver.

MARTIN-DECKER CORP., Long Beach, Calif.

MASTER ELECTRIC CO., THE, Dayton, O.—Star Mach'y Co., Seattle; Master Elec. Co., San Francisco, Los Angeles; Arthur E. Bacon, Denver; S. Y. Lakin, Salt Lake City.

MATTHEWS, INC., E. S., Spokane, Wash.—Branch Office: Seattle.

MAYTAG CO., The, Newton, Ia.—Branch Offices: Portland, Los Angeles, Colorado Springs, Dallas.

MEND-IT SUPPLY CO., Oakland, Calif.—Marwood Limited, Seattle, Portland, San Francisco, Los Angeles.

METAL WARE CORP., THE, Two Rivers, Wis.—J. Cuffin, Seattle; W. B. King, San Francisco.

METER DEVICES CO., Canton, O. —Wagner-Peterson Corp., Portland; J. G. Corrin, Los Angeles.

Meter Devices Co.
Largest Exclusive Manufacturers of Meter Testing Devices
Los Angeles — J. G. Corrin
Portland — Wagner-Peterson Corp.
Main Office and Factory
CANTON, OHIO
Catalog on Request

MEYERS SAFETY SWITCH CO., INC., San Francisco, Calif.—Allied Industries Inc., Portland.

MEYERS
Enclosed Safety Switches
Switchboards—Panelboards
Electrical Sheetmetal Products
Meyers Safety Switch Co., Inc.
419 Tehama Street, San Francisco

MICA INSULATOR CO., New York City—Electrical, Specialty Co. Inc., Seattle, San Francisco; Electrical Specialty Co. of Southern California, Los Angeles.

MIDGET HEATER & SPECIALTY CO., Tacoma, Wash.—Allied Industries Inc., Seattle; J. W. Cottrell, Portland.

MINERALLAC ELECTRIC CO., Chicago, Ill. — John Livingstone, Seattle; C. E. Ingalls, San Francisco; Farnham & Cunningham, Los Angeles.

MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis, Minn.—Arthur F. Erickson Co., Portland, San Francisco; English & Lauer, Los Angeles; Daly Co., Denver; Sullivan Valve & Eng. Co., Butte; Hawley-Richardson-Williams Co., Salt Lake City.

MOE-BRIDGES CO., Milwaukee, Wis.—Home Electric Co., Tacoma; Willamette Valley Supply Co., Salem; C. J. Heinig, Oakland; John W. Gill, Glendale.

MOHAWK TUBE CO., INC., Cohoes, N. Y.—Jobbers Supply Co., Seattle, Portland; Joslyn Co. of Calif., San Francisco, Los Angeles.

MONGERSON'S ELEC'L MACHINE WORKS, Bakersfield, Calif.—Leading Jobbers.

MONTGOMERY BROS., San Francisco, Calif.

MOORE, EDWARD T., Syracuse, N. Y.—Branch Offices: San Francisco, Denver, Salt Lake City.

MOREY & JONES, LTD., Los Angeles, Calif.—Consolidated Indus. Instr. Co., Seattle; Water Works Supply Co., San Francisco; Denver Fire Clay Co., Denver, Salt Lake City.

MORGANITE BRUSH CO., INC., Long Island City, N. Y.—Elec'l Eng'g Sales Co., Los Angeles.

MUELLER ELECTRIC CO., Cleveland, O.—H. E. Marshall, San Francisco.

MULLENBACH ELEC'L MFG. CO., Los Angeles, Calif.

NATIONAL CARBON CO., INC., Cleveland, O., New York City—C. R. Clendenen, Mgr. Pac. Coast Div., San Francisco; Branch Offices: Portland, Los Angeles,

NATIONAL ELEC. PRODUCTS CORP., Pittsburgh, Pa. — H. J. Newton, Pac. Coast Mgr., San Francisco; Branch Offices: Seattle, Los Angeles.

NATIONAL SPECIALTIES CO., Fort Wayne, Ind.—O. W. Coombs Sales Co., Los Angeles.

NATIONAL MILL & LUMBER CO., Oakland, Calif.—Branch Offices: Los Angeles, Salt Lake City.

NAUGLE POLE & TIE CO., Chicago, Ill.—O. C. Curtis, Branch Mgr., Spokane.

NEW DEPARTURE MFG. CO., THE, Bristol, Conn.—L. M. Woodward, Branch Mgr., San Francisco.

NEW HAVEN CLOCK CO., THE, New Haven, Conn.—J. H. Garnett, Branch Mgr., San Francisco.

NEWPORT NEWS SHIPBUILDING & DRY DOCK CO., Newport News, Va.

NINETEEN HUNDRED CORP., Binghamton, New York.—W. Lee Holmes, Branch Mgr., Los Angeles.

NOMA ELEC. CORP., New York City.—Branch Office: San Francisco.

NORGE CORPORATION, Detroit, Mich.—Sunset Elec. Co., Seattle, Portland; Marshall Wells Co., Spokane; Leo J. Meyberg Co., San Francisco, Los Angeles.

NORMA HOFFMANN BEARINGS CORP., Stamford, Conn.—Ahlberg Bearing Corp. of Calif., Inc., Seattle, Portland, San Francisco, Los Angeles, Phoenix; Irvin Silverberg & Co., San Francisco; Joseph A. Masterson & Co., Los Angeles.

NORTH AMERICAN ELECTRIC LAMP CO., St. Louis, Mo.—C. J. Gratiot & Sons, San Francisco; Rosse M. Gilson, Inc., Los Angeles.

NORTHERN PUMP CO., Minneapolis, Minn.—Pacific Marine Supply Co., Seattle; DeLaval Pacific Co., San Francisco; Nickerson Machine Co., Salt Lake City; Mountain States Machine Co., Denver.

OHIO BRASS CO., Mansfield, O.—Branch Offices: Seattle, San Francisco, Los Angeles.

OHIO ELECTRIC MFG. CO., THE, Cleveland, O.—A. S. Lindstrom Co., Seattle, Portland, San Francisco, Alhambra, Salt Lake City.

OKONITE CO., THE, Passaic, N. J. —I. W. Borda, Pac. Coast Mgr., San Francisco; Dist. Offices: Seattle, Los Angeles.

ONE MINUTE WASHER CO., Newton, Ia.—Coast Sales Co., Seattle; Kaemper-Barrett, San Francisco; O. S. Peterson Co., Los Angeles; Dorris-Heyman Co., Phoenix; Dodge Electric Co., Salt Lake City; H. A. Bobar, Sterling, Colo.

OSTRANDER ELEC. WORKS, INC., W. R., New York City—Panama Lamp & Commercial Co., San Francisco.

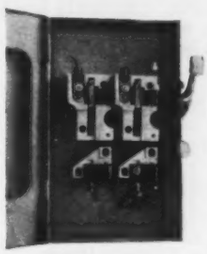
PACIFIC COAST STEEL CORP., San Francisco, Calif.—Branch Offices: Seattle, Portland, Los Angeles.

PACIFIC ELECTRIC MFG. CORP., San Francisco, Calif.—Branch Offices: Seattle, Los Angeles, Denver, Phoenix.

Special Transformers
Power and Distribution Transformers
Power Factor Improvement Static Condensers
Machinery Balancing Sets, Vibroscopes, and Vibrometers
"Doublsale" Live Line Maintenance Tools: Wood Insulators, Insulator Couplings, Grips, Chucks, Universals, Fusing Sets, Gounding Sets, Distribution Sets, Painting Sets, Tree Trimming Sets, Hack Saws, Screwdrivers, Wire Cutters, Wrenches, Grounding Clamps, Transmission Clamps, and other Tools.
Linemen's Rubber Gloves and Protectors
Mica Undercutters and Saws
Large Commutators

ELECTRIC AGENCIES
2059 Webster Street Oakland, California
Phone: GLencourt 7400

SAFETY (EM) **SWITCHES**



Self-Aligning Rotor with Double Break Contacts provides safe and larger rupturing capacity with more wiring space. Approved by Underwriters' Laboratories.

BAKERSFIELD, CALIF.

Mongerson's Electrical Machine Works

PACIFIC WIRE ROPE CO., Los Angeles, Calif.—Maydwell & Hartzell, Inc., San Francisco; Utilities Supply Co., Los Angeles; Stannard Arnold, Salt Lake City.

PARAGON ELEC. CO., Chicago, Ill.—Irving P. Bean, Seattle; Electric Sales Co., Los Angeles; Arthur E. Bacon & Co., Denver, Salt Lake City.

PARAMOUNT HEATING & MFG. CO., Seattle Wash.

PARKER ELECTRIC MFG. CO., Oakland, Calif.

PARTRICK & WILKINS CO., Philadelphia, Pa.—Ben C. Holst, San Francisco.

PASS & SEYMOUR, INC., Syracuse, N. Y.—J. M. Cavanaugh, Portland; J. G. Pomeroy, Co., San Francisco, Los Angeles; Fred E. Staible, Inc., Denver.

PEERLESS ELECTRIC CO., Warren, O.—U. K. Peterson, Portland, Ore.

PEERLITE MFG. & SUPPLY CO., San Francisco, Calif.

PELTON WATER WHEEL CO., THE, San Francisco, Calif.

PENN ELECTRIC SWITCH CO., Des Moines, Ia.—Garland-Affolter Engineering Corp., Seattle, San Francisco, Los Angeles.

PENNSYLVANIA TRANSFORMER CO., Pittsburgh, Pa.—Fred W. Carlson, Seattle; J. G. Corrin, Los Angeles; J. E. Redmond Co., Phoenix; J. Q. Lalor, Denver.

PERMATEX CO., INC., Brooklyn, N. Y.—Branch Offices: Los Angeles, Denver; T. L. Camp, Pasadena.

PHILADELPHIA STORAGE BATTERY CO., Philadelphia, Pa.—C. L. McWhorter, Pac. Coast Div. Mgr., San Francisco.

PIERCE, RENEWABLE FUSES INC., Buffalo, N. Y.—Leading Jobbers.

PITTSBURGH LECTROMELT FURNACE CORP., Pittsburgh, Pa.—R. A. Clark Co., Seattle; E. A. Wilcox Co., San Francisco; Sutor & Co., Los Angeles; Ambler & Riter Co., Salt Lake City; Denver Foundry Supply Co., Denver.

WHEN WRITING OR CALLING FIRMS LISTED
Please mention
The
Manufacturers' Directory
IN
ELECTRICAL WEST

John A. Roebling's Sons Company
of California
Electrical Wires and Cables, Bare—Insulated
San Francisco Los Angeles
Seattle Portland

PITTSBURGH REFLECTOR CO., Pittsburgh, Pa.—L. D. Morgan, Seattle; F. E. Hastings, Los Angeles.

PLYMOUTH RUBBER CO., INC., Canton, Mass.—M. J. Hamilburg, Branch Mgr., Los Angeles; Robinson Sales Co., Seattle; J. M. Cavanaugh, Portland; Joslyn Co. of Calif., San Francisco, Los Angeles.

PORCELAIN INSULATOR CORP., THE, Lima, N. Y.—Jobbers Supply Co., Seattle, Portland; Joslyn Co. of Calif., Los Angeles, San Francisco.

PORCELAIN PRODUCTS INC., Parkersburg, W. Va.—Allied Industries, Inc., Seattle, Portland, San Francisco, Los Angeles.

PORTABLE LIGHT CO., INC., THE, New York, N. Y.—W. W. Kirk, Los Angeles.

PORTER, INC., H. K., Everett, Mass.—Gillette & McLaren, Inc., Seattle, Portland; Omer Cox Co., San Francisco, Los Angeles; L. B. Youngs, Denver.

POSITIVE LOCK WASHER CO., THE, Newark, N. J.—Maydwell & Hartzell, Inc., San Francisco.

PREMIER VACUUM CLEANER CO., THE, Cleveland, O.—Branch Offices: Portland, San Francisco, Los Angeles.

PROMETHEUS ELECTRIC CORP., THE, New York, N. Y.—M. E. Hammond, San Francisco; R. E. Henry, Los Angeles; C. P. Helpman, Los Angeles.

PROVIDENCE INS. WIRE CO., Providence, R. I.—Maydwell & Hartzell, Inc., San Francisco, Los Angeles.

QUADRANGLE MFG. CO., Chicago, Ill.—R. E. Baum, San Francisco; A. Allen Smith, Los Angeles.

RAILWAY & INDUSTRIAL ENG'G CO., Greensburg, Pa.—H. B. Squires Co., Seattle, San Francisco; Ry. & Indus. Eng'g Co., Los Angeles; L. V. Wilson, Phoenix.

RALCO MFG. CO., Chicago, Ill.—W. W. Kirk, Los Angeles, San Francisco.

RAWLPLUG COMPANY, INC., THE, New York, N. Y.—J. H. Sutthoff, Seattle; The Rawlplug Sales Co., San Francisco; The Demmert Co., Los Angeles.

READRITE METER WORKS, Bluffton, O.—Howard M. Saul, Los Angeles

REFLECTOR & ILLUMINATING CO., Chicago, Ill.—H. B. Squires Co., Seattle, San Francisco, Los Angeles.

RED SPOT ELEC. CO., Tacoma, Wash.

RELIABLE ELECTRIC CO., Chicago, Ill.—General Electric Supply Corp., Graybar Elec. Co., San Francisco; Farnham & Cunningham, Kellogg Switchboard & Sup. Co., Sierra Equip. Corp., Los Angeles.

RELIANCE ELECTRIC ENG'G CO., Cleveland, O.—H. B. Squires Co., Seattle, San Francisco, Los Angeles; Mountain States Mach'y Co., Denver.

REMINGTON RAND, INC., Buffalo, N. Y.—Branch Offices: Seattle, Spokane, Portland, Sacramento, San Francisco, Oakland, Los Angeles, San Diego, Reno, Salt Lake City, Butte, Boise, Denver, Phoenix, Albuquerque, Cheyenne.

RHODES, INC., M. H., Hartford, Conn.—M. A. Dobbin, Portland; James P. Hermans, San Francisco; Geo. C. Maudsley, Los Angeles; James Blinn Co., Denver.

ROCKBESTOS PRODUCTS CORP., New Haven, Conn.—Anaconda Wire & Cable Co., Seattle, San Francisco, Los Angeles.

ROCKWOOD MFG. CO., THE, Indianapolis, Ind.—Leading Jobbers.

ROEBLING'S SONS CO., JOHN A., Trenton, N. J.—Branch Offices: Seattle, Portland, San Francisco, Los Angeles.

ROLLER-SMITH CO., New York City—J. C. McDougall, Seattle; Electric Material Co., San Francisco, Los Angeles; The Galigher Co., Salt Lake City; Mark G. Mueller, Denver.

Roller-Smith Co.
233 Broadway, New York
Works: Bethlehem, Pa.
INSTRUMENTS
(Indicating & Graphic)
CIRCUIT BREAKERS
(Air & Oil)
CONTROL PANELS
RELAYS
Offices in
San Francisco, Denver,
Los Angeles, Seattle,
Salt Lake City

MAYDWELL & HARTZELL
Incorporated
Factory Distributors for Electrical Transmission and Distribution Materials
Representing

James R. Kearney Corporation
Anchors, Cutouts, Fuse Switches, Fuses, Connectors, Cable Clamps, Live Line Tools, Electrical Distribution Specialties.

Providence Insulated Wire Co., Inc.
Bare, Weatherproof and Insulated Wires and Cables, Flexible Cords, A.B.C. Armored Cable and Conduit.

Pacific Wire Rope Company
"Copper Bearing" Steel Guy Strands.

McLaughlin Glass Company
Glass Insulators.

E. A. Foster Lumber Company
Douglas Fir Crossarms, Braces and Guy Wire Guards.

Lapp Insulator Company, Inc.
High Voltage Transmission Insulators, Distribution Insulators, Fog Type Insulators for all classes of service, Special Porcelain Bushings and Radio Insulators.

R. W. Cramer & Company, Inc.
"Sauter" Electric Time Switches

The Locust Pin Company, Inc.
Locust Pins, Standard Oak Brackets and Pole Steps.

L. D. McFarland Company, Ltd.
Creosoted and Untreated Cedar Poles, Posts and Piling.

Keystone Steel & Wire Company
"Copper Bearing" Telephone Wires.

Pole Line Hardware, Specialties and Construction Tools.

455 Colyton St., Los Angeles
OUR NAME MAYDWELL SPELLS QUALITY
158 Eleventh St. San Francisco

RUSSELL & STOLL CO., New York City—Fred W. Carlson, Seattle; L. W. Thompson, Los Angeles.

RUTENBER ELECTRIC COMPANY, Marion, Ind.—Irving P. Bean, Seattle; E. J. A. Gardiner, San Francisco; J. W. Laycock, Los Angeles.

S & M LAMP CO., Los Angeles, Calif.—H. H. Manny Co., Seattle; Baker & Prussia, Oakland; Harry Tanner, Denver.

SAFETY ELECTRIC CO., Chicago, Ill.—Panama Lamp & Commercial Co., San Francisco.

SAFETY LIVE LINE TOOL CO., Oakland, Calif.

SANGAMO ELECTRIC CO., Springfield, Ill.—Thomas S. Wood, Seattle; Sangamo Electric Co., San Francisco, Los Angeles, Phoenix; L. Brandenburger, Salt Lake City; Mountain States Machinery Co., Denver.

SAVAGE ARMS CORP., Utica, N. Y.—C. W. Adams, Branch Mgr., San Francisco.

SAYLOR ELECTRIC & MFG. CO., Detroit, Mich. — Robinson Sales Co., Seattle, Portland; Henger-Seltzer Co., San Francisco, Los Angeles.

SCHWARZE ELECTRIC CO., Adrian, Mich.—Allied Industries, Inc., Seattle, San Francisco, Los Angeles; J. M. Cavanaugh, Portland.

SCHWARTZ, S. ROBERT, Decatur, Ill.—P. D. Callahan, Los Angeles.

Russell & Stoll Co.
New York
Floor Boxes — Fan Hangers
Everlok Receptacles & Plugs
Explosion Proof Fittings
Watertight & Vapor Proof Fittings
LOS ANGELES: L. W. Thompson
SEATTLE: Fred Carlson

SCHWEITZER & CONRAD, INC., Chicago, Ill.—T. S. Wood, Seattle; H. M. Thomas, San Francisco; Farnham & Cunningham, Los Angeles; Peterson Company, Inc., Denver.

Meters and Time Switches
SANGAMO - LINCOLN ECONOMY
L. A. NOTT
1061 Howard Street
San Francisco
Central-Northern California
Nevada, Oregon

SEEGER REFRIGERATOR CO., St. Paul, Minn.—Branch Offices: San Francisco, Los Angeles.

SENTRY COMPANY, THE, Taunton, Mass.—E. A. Wilcox Co., San Francisco.

SESSIONS CLOCK CO., THE, Forestville, Conn.—S. J. Hammond, San Francisco.

ENGINEERING AND GENERAL SUPPLY CO.
J. G. Monahan
Southern California Representatives
Sangamo Electric Co. Meters
Acme Wire Co. Condensers
326 Subway Terminal Bldg., Los Angeles
MUtual 2603

Appliance Specialists

Pacific Coast Distributors for

Silex Glass Coffee Makers

Victor Fans

Bee-Vac Cleaners Washers

Birtman Elec. Co.

Nesco Casseroles

National Enameling & Stamping Company

THE GUTE COMPANY LTD.

308 Eleventh St. San Francisco

1325 So. Harvard Blvd. Los Angeles

SEWARD WIRE CO., INC., Parkersburg, W. Va.—Keeler, White Co., Seattle, San Francisco, Los Angeles.

SHARPLES SPECIALTY CO., THE, Philadelphia, Pa.—T. J. Griffin, Branch Mgr., San Francisco.

SILEX COMPANY, Hartford, Conn. —The Gute Co., Ltd., San Francisco, Los Angeles.

SKF INDUSTRIES, INC., New York City—Branch Offices: Portland, San Francisco, Los Angeles.

SORGEL ELECTRIC CO., Milwaukee, Wis.—Fred W. Carlson, Seattle; Sidney B. Martin, Los Angeles.

SOUTH BEND CURRENT CONTROLLER CO., South Bend, Ind. —Line Material Co., Portland, Oakland, Los Angeles; Farnham & Cunningham, Los Angeles; Westinghouse Elec. & Mfg. Co., Seattle, San Francisco, Los Angeles, Salt Lake City.

SPAULDING FIBRE CO., INC., Tonawanda, N. Y.—C. D. LaMoree, San Francisco, Los Angeles.

SPECIALTY DEVICE CO., THE, Cincinnati, O.—Western Electric Co., Inc., Emeryville; Metropolitan Warehouse Co., Los Angeles.

STANDARD ELECTRIC STOVE CO., THE, Toledo, O.—Wm. P. Swartz, Dist. Repr., Los Angeles. Jobbers.

STANDARD GAS VALVE CO., Pasadena, Calif.—Electric Agencies, Oakland.

STEEL CITY ELECTRIC CO., Pittsburgh, Pa.—Robinson Sales Co., Seattle; Leonard S. Foley, Portland; Henger-Seltzer Co., San Francisco, Los Angeles.

STEELDUCT COMPANY, THE, Youngstown, O.—Henger-Seltzer Co., San Francisco, Los Angeles.

STEEL CO., HERMAN D., Philadelphia, Pa.—George L. Hoffman, Portland; A. F. Blecksmith, Los Angeles; H. E. Holland, Salt Lake City.

STERLING ELEC. MOTORS, INC., Los Angeles, Calif.—H. S. Emanuels, Seattle; Harry A. Brod, Portland; A. H. Coates Co., San Francisco, Oakland; Ott Hdwe.

STURTEVANT CO., THE B. F., Hyde Park, Boston, Mass.—Branch Offices: Portland, San Francisco, Denver.

SUPERHEATER COMPANY, THE, New York, N. Y.—F. J. Hearty & Co., San Francisco; Joy and Cox, Inc., Denver.

SUPERIOR ELECTRIC PRODUCTS CORP., St. Louis, Mo.—Coast Distributing Co., Seattle; Kenneth L. Stedman, San Francisco; H. F. Suprenand, Los Angeles.

SUPERIOR INSULATING TAPE CO., St. Louis, Mo.—Irving P. Bean, Seattle; Thomas D. Noble, San Francisco; W. Bert Knight, Los Angeles.

TAPER TUBE POLE CO., San Francisco, Calif.

TAPLET MFG. CO., Philadelphia, Pa.—Keeler, White So., Seattle, San Francisco, Los Angeles; Wesco Co., Denver.

TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y.—Branch Offices: San Francisco, Los Angeles, Denver.

TAYLOR-WINFIELD CORP., THE, Warren, O.—E. A. Wilcox Co., San Francisco; J. Max Lee Co., Los Angeles.

TEMPLETON, KENLY & CO., Chicago, Ill.—Charles C. Floyd Co., H. H. Hale Co., San Francisco.

Thermador Electrical Manufacturing Co.

Successors to

Hoffman Specialty Co., of Calif.

and

Everhot Electric & Mfg. Co.

Electric Air and Water Heaters

116 LLEWELLYN ST., LOS ANGELES, CALIF.

San Francisco—Clyde L. Chamblin, 839 Mission Street

Special Heating Equipment on Request

TRICO **FUSES**

RENEWABLE
Superior Time-Lag.
They're Powder Packed

KANTARK
One-Time Fuses.
Built for Service

COLORTOP
Plug Fuses.
Color Indicates Size

OPTO-MATIC OILERS
Automatic Visible Lubricator

FUSE PULLERS
Made in Four Sizes

KLIPLOK
Clamps for Fuse Clips.
Lock Like a Vise

Stock Carried At

SAN FRANCISCO — Henger-Seltzer Company

LOS ANGELES — Henger-Seltzer Company

SEATTLE — A. S. Knight Company

General Sales Office and Plant

MILWAUKEE WISCONSIN

TEXAS CREOSOTING CO., Orange, Tex.—W. W. Wilkinson, Los Angeles.

THERMADOR ELEC'L MFG. CO., Los Angeles, Calif.—Leading Jobbers.

THERMOELECTRIC PRODUCTS LTD., Oakland, Calif.—Jobbers.

THOMAS & BETTS CO., THE, Elizabeth, N. J.—H. B. Squires Co., Seattle, San Francisco, Los Angeles; James H. Blinn Co., Denver; Raymond Ackerman, Salt Lake City.

THOMAS & SONS CO., THE R., Lisbon O.—Graybar Electric Co., Inc., all principal cities.

THOMPSON ELEC. CO., Cleveland, O.—Leading Jobbers.

THORDARSON ELECTRIC MFG. CO., Chicago, Ill.—L. B. Bryan, Seattle; W. I. Otis, San Francisco; J. J. Perlmuth, Los Angeles; Jack L. Hursch Co., Denver.

TORK CLOCKS INC., c/o Ward Leonard Elec. Co., Mt. Vernon, N. Y.—C. J. White, Los Angeles.

TORRINGTON COMPANY, THE, Torrington, Conn.—Branch Offices San Francisco, Los Angeles.

TRIANGLE CONDUIT & CABLE CO., INC., Brooklyn, N. Y.—Branch Offices: Seattle, San Francisco, Los Angeles, Denver.

TRICO FUSE MFG. CO., Milwaukee, Wis.—A. S. Knight Co., Seattle; Henger-Seltzer Co., San Francisco, Los Angeles.

TRIPLEX PRODUCTS CORP., New York City—B. S. Robinson, Sales Eng'r, San Francisco.

ELECTRICAL INSULATION

Spaulding

Fibre—Spauldite (Bakelite)
Complete shops at Los Angeles

Hope

Electric tapes and Sleevings

Irvington

Varnished cambric—tapes
Spaghetti tubing

Macallen

Mica for all purposes

Manning Pressboard

Pacific Coast Stocks

C. D. LaMoree

Los Angeles
1325 San Julian St.

San Francisco
1889 Mission St.

STANDARD TRANSFORMER CO., THE, Warren, O.—J. C. McDougall, Seattle; W. W. Kirk, Los Angeles.

STAR MFG. CO., INC., St. Louis, Mo.—Jobbers.

STANLEY & PATTERSON, INC., New York City—Fred W. Carlson, Seattle; C. D. LaMoree, San Francisco, Los Angeles; Fred E. Staible, Inc., Denver; Raymond Ackerman, Salt Lake City.

STAR EXPANSION BOLT CO., New York City—H. Heath, Seattle; E. B. Sutton & Co., San Francisco, Los Angeles.

STATES CO., THE, Hartford, Conn. —G. L. Hoffman, Portland; H. M. Thomas Co., San Francisco; Elec'l Engineering Sales Co., Los Angeles.

STEEL AND TUBES, INC., Cleveland, O.—Branch Offices: Seattle, San Francisco, Los Angeles.

Co., Santa Barbara; Wesco Co., Denver; Industrial Supply Co., Salt Lake City; J. E. Redmond, Phoenix.

STRAIT & RICHARDS, INC., Newark, N. J.—Pacific Lamp & Supply Co., Seattle; Nadon Eng. & Sales Co., San Francisco.

STROMBERG-CARLSON TEL. MFG. CO., Rochester, N. Y.—F. K. Cannon, Pac. Coast Branch Mgr., San Francisco; Branch Offices: Seattle, San Francisco, Los Angeles.

STROMBERG ELECTRIC CO., Chicago, Ill.—Eicher & Bratt, Seattle; R. C. Farrington, Portland; R. E. Peters, San Francisco; Electric Sales Co., Los Angeles; A. F. Krippner, Denver; F. C. Richmond Mach'y Co., Salt Lake City.

SUPERIOR SWITCHBOARD & DEVICES CO., THE, Canton, O.—T. S. Wood, Seattle, Ben C. Holst, San Francisco.

SURETY RUBBER CO., THE, Carrollton, O.—E. D. Bullard Co., San Francisco, Los Angeles, Salt Lake City; Colorado Rubber Co., Denver.

SUTORBILT CORP., Los Angeles, Calif.

SWARTZBAUGH MFG. CO., THE, Toledo, O.—J. M. Cavanaugh, Portland; E. J. Baughman, Los Angeles.

SYNTRON CO., Pittsburgh, Pa.—Marwood, Ltd., Seattle, Spokane, Portland; Peter H. Nelson, San Francisco; M. N. Thackaberry, Los Angeles; Ivan R. Walton, Salt Lake City; A. F. Krippner, Denver.

EVERHOT APPLIANCES

Cookers — Casseroles — Food Conveyors — Heavy Duty Cooking equip. — Ranges — Appliances

Swartzbaugh Mfg. Co.

E. J. BAUGHMAN
1317 Willow St., Los Angeles
TRinity 5744

T & B

means *The Best* in Conduit Fittings

THE THOMAS & BETTS CO.
Elizabeth, New Jersey
H. B. SQUIRES CO., *Agents*

TRIPLEX

Time Switches
Leland Flashers

B. S. ROBINSON
190-9th St., San Francisco

Westinghouse
Electric
Home Appliances

Full line of electric refrigerators, water coolers, ranges, water heaters, washing machines, ironers, vacuum cleaners, food mixers, heating appliances, fans, lamps, and wiring devices.

Also, nearly everything electrical for stores, offices, factories, as well as for the home.

▼

Westinghouse Electric Supply Company

Los Angeles San Francisco Oakland
Phoenix Spokane Butte

FOBES SUPPLY COMPANY
Seattle Portland

TRUMBULL ELEC. MFG. CO., THE, Plainville, Conn.—Branch Offices: Seattle, San Francisco, Los Angeles.

UNION INSULATING CO. and J. H. Parker, New York City—H. B. Squires Co., Seattle, San Francisco, Los Angeles; J. H. Blinn Co., Denver.

UNION METAL CO., Canton, O.—R. G. VandenBoom, Branch Mgr., Los Angeles.

UNITED STATES ELECTRIC MFG. CORP., New York City—E. Ulman, San Francisco; Electrical Sales Co., Denver.

UNITED ELEC'L MFG. CO., Adrian, Mich.—E. F. Hardin, Portland; E. C. Ward & Co., San Francisco, Los Angeles.

UNITED STATES GRAPHITE CO., THE, Saginaw, Mich.—Marwood, Limited, Seattle, San Francisco, Los Angeles.

UNITED STATES RUBBER PRODUCTS, INC., New York City.—H. M. Green, Dist. Mgr., Mech. Sales, San Francisco.

UPTEGRAFF MFG. CO., R. E., Pittsburgh, Pa. — The Demmert Co., Los Angeles.

UTILITY ELEC. CO., St. Louis, Mo.—Branch Offices: San Francisco, Los Angeles. Domestic: R. A. Johnston Co., Seattle; W. C. Rice Co., San Francisco. Commercial: Edminster Co., San Francisco; John H. Johnson, Los Angeles.

UTILITY PROPELLER FAN CO., Los Angeles, Calif.—Branch office San Francisco.

VALLEY MFG. CO., Woodburn, Ore.—Leading Jobbers.

VELVETONE POSTER CO., San Francisco, Calif.

VIKING PUMP CO. OF DELAWARE, Cedar Falls, Ia.—International Engineering Corp., Seattle; DeLaval Pacific Co., San Francisco; Viking Pump Co., Los Angeles; National Equipment Co., Monroe Crisell, Inc., Salt Lake City; Hendrie-Bolthoff Supply Co., Denver.

ELECTRICAL ENGINEERING SALES CO.

Los Angeles
575 Subway Terminal Bldg.

San Francisco
622 Underwood Bldg.

Southern California and Arizona Representatives for

Weston Electrical Instrument Corp. — The States Co.
Jewell Electrical Instrument Corp. — Chas. J. Henschel & Co.
Morganite Brush Co., Inc. (California & Ariz.)

VULCAN ELEC. HEATER CORP., New York City—Ben C. Holst, San Francisco.

VULCAN MANUFACTURING COMPANY, Kansas City, Mo.—Western Furniture Exchange, San Francisco.

WADSWORTH ELEC. MFG. CO., INC., Covington, Ky.— Keeler, White Co., Seattle, San Francisco, Los Angeles.

WAGNER ELECTRIC CORP., St Louis, Mo.—Branch Offices: Seattle, Portland, San Francisco, Los Angeles, Denver, Salt Lake City.

WAILES DOVE-HERMISTON CORP., New York City—S. J. Porter Branch Mfg., San Francisco.

WAKEFIELD BRASS CO., THE F. W., Vermilion, O.—F. W. Loomis, Hollywood.

WALKER BROTHERS, Conshohocken, Pa.—Garnett Young & Co., Seattle, San Francisco, Los Angeles.

WALKER DISHWASHER CORP., Chicago, Ill.—Branch Offices: Seattle, San Francisco, Los Angeles.

WARD LEONARD ELECTRIC CO., Mt. Vernon, New York—R. C. James Co., Seattle; Electric Material Co., San Francisco; A. R. Slimmon Co., Los Angeles; Raymond T. Ackerman, Salt Lake City.

WARREN TELECHRON CO., Ashland, Mass.—Guy Cooper, Branch Mgr., Los Angeles. Jobbers.

WATERS-GENTER CO., Minneapolis, Minn.—Commercial: C. N. Hildebrandt, San Francisco. Domestic: Miss Adeline Dryer, San Francisco; Mrs. Eulalia Brandhuber, Long Beach.

WATLOW ELEC. MFG. CO., St. Louis, Mo.—Walter S. Sweet, Los Angeles.

WEJ-LOCK Co., Winterset, Ia.—W. D. Howze, Los Angeles.

WELDON MANUFACTURING CO., New York, N. Y.—Panama Lamp & Commercial Co., San Francisco.

WELLS MFG. CO., San Francisco, Calif.

WESIX, INC., San Francisco, Calif.—Branch Factories; Seattle, Los Angeles.

WEST COAST SPECIALTIES, LTD., Los Angeles, Calif.—Fred C. Wood, Portland.

WEST COAST WOOD PRESERVING CO., Seattle, Wash.—The Charles Nelson Co., San Francisco.

WESTERN PIPE & STEEL CO., OF CAL., San Francisco, Calif.—Branch Offices: Fresno, Bakersfield, Los Angeles, Phoenix.

WESTERN ELECTRO-MECHANICAL CO., INC., Oakland, Calif.—George L. Hoffman, Portland; C. F. Henderson, San Francisco; Farnham & Cunningham, Los Angeles.

WESTINGHOUSE ELEC. & MFG. CO., East Pittsburgh, Pa.—W. R. Marshall, Com'l Vice. Pres., San Francisco; Branch Offices: Seattle, Portland, San Francisco, Los Angeles, Butte, Phoenix, Salt Lake City.

WESTINGHOUSE ELEC. & MFG. CO., (Mdse. Dept.) Mansfield, O.—C. A. Meier, Pac. Coast Sales Mgr., San Francisco. Branch Offices: Seattle, Portland, San Francisco, Los Angeles, Butte, Phoenix, Salt Lake City.

WESTINGHOUSE LAMP CO., New York City—Ray W. Murphy, Pac. Coast Mgr., San Francisco. Branch Offices: Seattle, San Francisco, Los Angeles, Denver, Salt Lake City.

WESTON ELEC'L INSTR. CORP., Newark, N. J.—Eicher & Bratt, Seattle; C. F. Henderson, San Francisco; Elec'l Eng'g Sales Co., Los Angeles.

WEYERHAEUSER SALES CO., Cedar Pole Div., St. Paul, Minn.—Branch Offices: Spokane, San Francisco, Sacramento, Los Angeles.

WHIRLDRY CORPORATION, New Haven, Conn.—Wm. C. King, Branch Mgr., Los Angeles.

WIEGAND COMPANY, EDWIN L., Pittsburgh, Pa.—Michaels Equipment Co., Seattle, Portland; Electric Material Co., Inc., San Francisco, Los Angeles.

WILCOLATOR CO., THE, Newark, N. J.

WILHITE MACHINE WORKS, INC., Los Angeles, Calif.

WILMINGTON FIBRE SPECIALTY CO., Wilmington, Delaware—Gillette and McLaren, Seattle; Sands and Camp, San Francisco, Los Angeles.

WILSON RUBBER CO., THE, Canton, O.—Ralphs-Pugh Co., San Francisco.

WING MFG. CO., L. J., New York City—Halloran & Pardee, San Francisco; A. G. Orear, Los Angeles; P. A. Douden & Co., Denver; C. H. Spencer, Salt Lake City.

WIRT COMPANY, Philadelphia, Pa.—Irving P. Bean, Seattle; Thomas D. Noble, San Francisco; W. B. Knight, Los Angeles; Paul A. Douden, Denver.

TIME SWITCHES
(frequency type)
For all purposes

Automatic
Double Throw Switches
Eliminate Wiring
for water heaters

WESIX
HEATER FACTORIES
San Francisco, Los Angeles, Seattle

WISE-McCLUNG, INC., New Philadelphia, O.—Turpins, Fresno.

WOLVERINE TUBE CO., Detroit, Mich.—Leonard S. Foley, Portland; Brad Squires, Inc., Oakland, Los Angeles; James H. Blinn Co., Denver.

WOOD ELEC. CO., INC., C. D., New York City—Rapid Appliance Corp., Los Angeles.

WOODS MACHINE CO., S. A., Boston, Mass.—Branch Offices: Seattle, Portland; Eby Machinery Co., San Francisco, Los Angeles.

WOODWARD GOVERNOR CO., Rockford, Ill.—A. N. Geyer, Branch Mgr., Seattle.

WORTHINGTON CO., INC., THE, Harrison, N. J.—Branch Offices: Seattle, San Francisco, Los Angeles, Salt Lake City.

WUELKER REFLECTOR LIGHTING CORP., San Francisco, Calif.

YOUNG BROTHERS CO., Detroit, Mich.—B. F. Easterbrooks, Seattle; E. A. Wilcox, San Francisco.

YOUNGSTOWN SHEET & TUBE CO., THE, Youngstown, O.—Branch Offices: Seattle, San Francisco, Denver. Allied Industries, Inc., Seattle, Portland, San Francisco, Los Angeles.

WESTON ELECTRICAL
INSTRUMENT CORP.
Main Office, Newark, N. J.

Service Representatives

DENVER
Wm. Ainsworth & Sons, Inc.
2151 Lawrence St.

LOS ANGELES
Quality Elec. Co., Ltd.
812 So. San Pedro St.

SAN FRANCISCO
Pacific Elec. Instrument Lab.
600 Call Building

ZENITH MACHINE CO., Duluth, Minn.—Marshall-Wells Co., Seattle, Tacoma, Portland; W. C. Bailess, Los Angeles.

THE WILCOLATOR CO.
Newark, N. J.

Oven Heat Controls
Thermostatic Water
Mixing Valves

TORK CLOCKS
C. J. WHITE
445 E. 3rd St.
Los Angeles
315A 12th St.
Oakland

ROBINSON SALES COMPANY
617 4th Ave., Seattle
53 4th St., Portland

WHERE TO BUY IT IN THE WEST

This guide to products supplements The Manufacturers' Directory. Under the name of the appliance or equipment will be listed the manufacturers of that product; by cross-checking with the listings in the directory, the local agents for any item thus can be found. If further information is desired, write to ELECTRICAL WEST, 883 Mission St., San Francisco, Calif. While the same care has been exercised in compiling this guide as in the directory, the publishers assume no responsibility for errors or omissions, but will make such corrections and additions as are requested within the restrictions set.

Air Conditioning
Frigidaire Corp.

Anchors, Guy
James R. Kearney Corp.
Maydwell & Hartzell, Inc.

Appliances, Household
Chicago Flexible Shaft Co.
Edison Gen. Elec. Appliance Co., Inc.
General Elec. Co.
Graybar Elec. Co., Inc.
The Gute Co., Ltd.
A. J. Lindemann & Hoverson Co.
Malleable Iron Range Co.
Standard Elec. Stove Co.
Swartzbaugh Mfg. Co.
Waters-Genter Co.
Westinghouse Elec. Supply Co.

Batteries, Storage
Elec. Storage Battery Co.

Boxes
Elec. Power Equip. Corp.
General Cable Corp.
Russell & Stoll Co.
Thomas & Betts Co.

Brackets, Wood
Locust Pin Co.

Bus Fittings
Burndy Eng'g Co.
Elec. Power Equip. Corp.

Cable Accessories
Anaconda Wire & Cable Co.
General Cable Corp.
John A. Roebling's Sons Co.

Cables
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Lenz Elec. Mfg. Co.
National Elec. Products Corp.
Rockbestos Products Corp.
John A. Roebling's Sons Co.
Westinghouse Elec. & Mfg. Co.

Carbon Brushes
Morganite Brush Co.

Circuit Breakers
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Cable
James R. Kearney Corp.

Compounds, Insulating
John C. Dolph Co.
General Cable Corp.

Condensers, Electric
Allis-Chalmers Mfg. Co.
J. G. Corrin
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conduit
Fretz-Moon Tube Co.
General Elec. Co.
National Elec. Products Corp.
Steel & Tubes, Inc.
Youngstown Sheet & Tube Co.

Conduit, Underground
Johns-Manville Corp.

Connectors
Burndy Eng'g Co.
Electroline Co.
James R. Kearney Corp.

Contactors
Ward Leonard Elec. Co.

Control, Oven Heat
The Wilcolator Co.

Controllers
Diamond Elec. Mfg. Co.
Elec. Power Equip. Corp.

Cords
American Steel & Wire Co.
Anaconda Wire & Cable Co.
Lenz Elec. Mfg. Co.
Rockbestos Products Corp.

Cutouts
James R. Kearney Corp.
Westinghouse Elec. & Mfg. Co.

Dimmers, Theatre
Ward Leonard Elec. Co.

Distribution Specialties
General Elec. Co.
Graybar Elec. Co., Inc.
Hubbard & Co.
James R. Kearney Corp.
Maydwell & Hartzell, Inc.

Drives
Rockwood Mfg. Co.

Electrodes, Arc Welding
John A. Roebling's Sons Co.

Fans
Century Elec. Co.
Dallas Eng'g Corp.
Emerson Elec. Mfg. Co.
General Elec. Co.
Wagner Elec. Corp.
Westinghouse Elec. & Mfg. Co.

Fittings, Conduit
National Elec. Products Corp.
Steel & Tubes, Inc.

Fixtures, Lighting
Russell & Stoll Co.
Thomas & Betts Co.

Fuse Pullers
G.C.A. Mfg. Co.

Fuses
Colt's Patent Fire Arms Mfg. Co.
James R. Kearney Corp.
Trico Fuse Co.

Generators
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Governors
S. Morgan Smith Co.

Heaters, Air
Edison Gen. Elec. Appliance Co.
Sandoval Sales Co.
Standard Elec. Stove Co.
Thermador Elec'l Mfg. Co.
Wesix Inc.
Westinghouse Elec. & Mfg. Co.
Edw. L. Wiegand Co.

Heaters, Water
Clyde L. Chamblin Co.
Edison Gen. Elec. Appliance Co.
A. J. Lindemann & Hoverson Co.
Malleable Iron Range Co.
Sandoval Sales Co.
Standard Elec. Stove Co.
Thermador Elec'l Mfg. Co.
Wesix Inc.
Westinghouse Elec. & Mfg. Co.

Instruments, Measuring
Elec'l Eng'g Sales Co.
General Elec. Co.
Quality Elec. Co.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l Instrument Corp.

Insulation
Colt's Patent Fire Arms Mfg. Co.
Johns-Manville Corp.
C. D. LaMoree

Insulators
Corning Glass Works
Garland Affolter Eng'g Co.
Hemingray Glass Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
Maydwell & Hartzell, Inc.
McLaughlin Glass Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Lamp Changers
G.C.A. Mfg. Co.

Lamps, Mazda
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Vapor
General Elec. Vapor Lamp Co.
Keese Eng'g Co.

Lamps, Sun
Chicago Flexible Shaft Co.
General Elec. Co.
Graybar Elec. Co., Enc.

Lighting Equipment
Day-Brite Reflector Co.
Schleicher & Co., Inc.

Line Material
Ohio Brass Co.

Meters
Eng'g & Gen. Supply Co.
L. A. Nott
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.

Motors
Allis-Chalmers Mfg. Co.
Century Elec. Co.
Emerson Elec. Mfg. Co.
General Elec. Co.
Wagner Elec. Corp.
Westinghouse Elec. & Mfg. Co.

Motor Starters
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Oil—Purifiers, clarifiers, extractors
De Laval Separator Co.

Panel Boards
Diamond Elec. Mfg. Co.
General Elec. Co.
Meyers Safety Switch Co.
Signal Eng'g & Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Pins, Wood
Locust Pin Co.

Pole Line Hardware
Associated Wholesale Elec. Co.
Graybar Elec. Co., Inc.
Joslyn Co. of Calif.
Locke Insulator Corp.
Maydwell & Hartzell, Inc.

Poles
Maydwell & Hartzell, Inc.
Pacific Coast Steel Corp.

Public Utilities
Pacific Gas and Elec. Co.
Southern Calif. Edison Co. Ltd.

Pulleys
Rockwood Mfg. Co.

Pumps
Pelton Water Wheel Co.

Ranges
Edison Gen. Elec. Appliance Co.
Estate Stove Co.
Graybar Elec. Co., Inc.
A. J. Lindemann & Hoverson Co.
Malleable Iron Range Co.
Rutenber Elec. Co.
Standard Elec. Stove Co.
Westinghouse Elec. & Mfg. Co.

Reflectors
Day-Brite Reflector Co.

Refrigerators
Frigidaire Corp.
General Elec. Co.
Grigsby-Grunow Co.
Malleable Iron Range Co.
Westinghouse Elec. & Mfg. Co.

Regulators, Speed
Ward Leonard Elec. Co.

Relays
General Elec. Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Resistors
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Rheostats
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Service Organizations
Elec. Refrigeration Bureau
Elec'l Testing Labs.
C. C. Moore & Co. Engineers
National Elec. Cookery Council
Pacific Coast Elec'l Bureau
Stone & Webster Eng'g Corp.
Western Elec. Co.

Signal Systems
Automatic Elec. Co.
Signal Eng'g & Mfg. Co.

Signs, High Voltage
W. D. Howze Sales Co.

Steel Products
Pacific Coast Steel Corp.

Switchboards
Allis-Chalmers Mfg. Co.
Diamond Elec. Mfg. Co.
Meyers Safety Switch Co.

Switches, High Tension
Elec. Power Equip. Corp.
James R. Kearney Corp.
General Elec. Co.
W. W. Kirk
Struthers Dunn, Inc.
Westinghouse Elec. & Mfg. Co.

Switches, Meter Test
Meter Devices Co.

Switches, Safety
Colt's Patent Fire Arms Mfg. Co.
Diamond Elec. Mfg. Co.
Meyers Safety Switch Co.
Mongerson's Elec'l Mach. Works.

Switches, Time
R. W. Cramer & Co.
Landis & Gyr Co.
Sangamo Elec. Co.
Tork Clocks, Inc.
Triplex Products Corp.

Switchgear
Allis-Chalmers Mfg. Co.
Elec. Power Equip. Corp.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Tapes
Johns-Manville Corp.

Telephone Systems
American Elec. Co.
Automatic Elec. Co.
Sierra Equip. Corp.
Western Elec. Co.

Terminals, Cable
General Cable Corp.

Thermostats
Struthers Dunn, Inc.

Tools, Live Line
James R. Kearney Corp.

Towers, Transmission
Pacific Coast Steel Corp.

Transformers
Allis-Chalmers Mfg. Co.
American Transformer Co.
Electric Agencies
General Elec. Co.
Jeffries Transformer Co.
Sangamo Elec. Co.
Wagner Elec. Corp.
Westinghouse Elec. & Mfg. Co.

Tubing, Elec'l Metallic
Steel & Tubes, Inc.

Turbines
Newport News Shipbuilding & Dry Dock Co.
Pelton Water Wheel Co.
S. Morgan Smith Co.

Valves
Ohio Brass Co.
Pelton Water Wheel Co.
S. Morgan Smith Co.

Washers, Clothes
Little Giant, Inc., Ltd.
Voss Bros. Mfg. Co.

Water Wheels
Pelton Water Wheel Co.

Wire
American Steel & Wire Co.
Anaconda Wire & Cable Co.
Crescent Ins. Wire & Cable Co.
Driver-Harris Co.
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Indiana Steel & Wire Co.
C. E. Ingalls (Copperweld).
Lenz Elec. Mfg. Co.
Maydwell & Hartzell, Inc.
National Elec. Products Corp.
Rockbestos Products Corp.
John A. Roebling's Sons Co.
Westinghouse Elec. & Mfg. Co.

Wiring Supplies
Graybar Elec. Co., Inc.
Russell & Stoll Co.
Sierra Equip. Corp.
H. B. Squires Co.
Thomas & Betts Co.
Westinghouse Elec. Supply Co.

PROFESSIONAL DIRECTORY

BYLLESBY
ENGINEERING & MANAGEMENT CORPORATION
Wholly-owned Subsidiary of
Standard Gas and Electric Company
231 South LaSalle Street, Chicago
New York Pittsburgh San Francisco

ELECTRICAL TESTING LABORATORIES
Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory
80th St., and East End Ave., New York

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Contractors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

Your card here builds favorable prestige for you. The cost is extremely small. The value is great as a business aid.

ARTHUR R. KELLEY
CONSULTING ENGINEER
Reports and Valuations, Public Utility Industrial Properties
Edison Bldg. Los Angeles

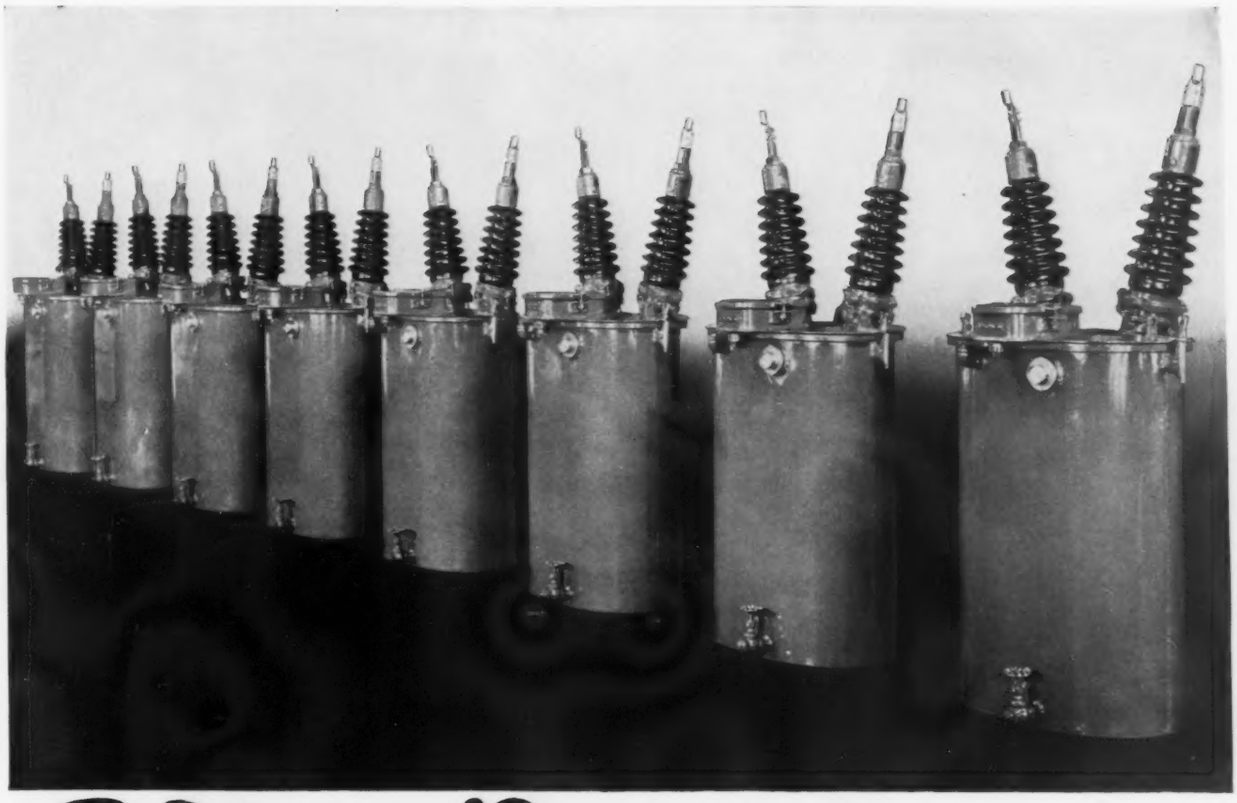
In any line, a specialist does the best job.
Why not consult the firms listed here on your next undertaking?

ALPHABETICAL INDEX TO ADVERTISERS

Allis-Chalmers Mfg. Co. ..... Inside Back Cover
Burndy Engineering Co., Inc. 18
Edison General Electric Appliance Co., Inc. 6, 7
Frigidaire Corp. 9
General Cable Corp. 17
General Electric Co., Nela Park 10
General Electric Co., Schenectndy. 11, 16
Indiana Steel & Wire Co. 18
Locke Insulator Corp. ..... Inside Front Cover
McGraw-Hill Book Co., Inc. 16
Malleable Iron Range Co. 5
Neal, Stratford & Kerr 18
Pacific Coast Electrical Bureau ..... Back Cover
Pacific Gas and Electric Company 4
Pelton Water Wheel Co. 14
Southern California Edison Company Ltd. 8
Steel & Tubes Inc. 15
Westinghouse Electric & Mfg. Co. 12, 13
Westinghouse Electric & Mfg. Co. Refrigeration Division 3

Manufacturers' Directory

American Transformer Co. 19
Associated Wholesale Electric Co. 22
Chamblin Co., Clyde L. 19
Corrin, J. G. 20
Cramer & Co., R. W. 20
Crescent Insulated Wire & Cable Co. 20
Dolph Co., John C. 20
Driver-Harris Co. 21
Electric Agencies 23
Electrical Engineering Sales Co. 26
Electroline Co. 21
Engineering & General Supply Co. 24
Garland-Affolter Engineering Co. 22
Gute Company Ltd., The 25
Howze Sales Co., W. D. 19
Ingalls, C. E. 20
Jeffries Transformer Co. 22
Joslyn Company of Calif. 22
Keese Engineering Co. 21
Kirk, W. W. 20
La Moree, C. D. 25
Landis & Gyr Co. 22
Little Giant Inc. Ltd. 23
Maydwell & Hartzell, Inc. 24
Meter Devices Co. 23
Meyers Safety Switch Co., Inc. 23
Mongerson's Electrical Machine Works 23
Nott, L. A. 24
Quality Electric Co. 21
Roebling's Sons Co. of Calif., John A. 24
Roller-Smith Co. 24
Russell & Stoll Co. 24
Sandoval Sales Co. 20
Schleicher & Co., Inc. 21
Squires Co., H. B. 20
Swartzbaugh Mfg. Co. 25
Thermador Electrical Mfg. Co. 25
Thomas & Betts Co., The 25
Tork Clocks, Inc. 26
Trico Fuse Mfg. Co. 25
Triplex Products Corp. 25
Wesix, Inc. 26
Westinghouse Electric Supply Co. 26
Weston Electrical Instrument Corp. 26
Wilcolator Co., The 26



A New Line of Potential Transformers

THIS new line of high voltage potential transformers, recently developed by Allis-Chalmers engineers, incorporates many outstanding advantages. They have oil filled high voltage bushings, magnetic oil gauges and insulation co-ordinated with impulse strength of the bushing. Their accuracy meets the highest standards of N.E.M.A.

Eight of these type "PW" transformers are illustrated above. These are 33,000 volt, 50 cycle units and were built for the Metropolitan Water District, Los Angeles, California.

Allis-Chalmers complete line of transformers includes all sizes, frequencies and voltages for power, distribution, network, instrument and metering units.

A copy of bulletin No. 148 describing the complete line of Allis-Chalmers Instrument and Metering Transformers and outdoor Metering Outfits will be sent on request.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.

ALLIS-CHALMERS
TRANSFORMERS

PACIFIC COAST OFFICES:
Rialto Building, San Francisco, Calif. 1117 Rowan Building, Los Angeles, Calif. 1623 Smith Tower, Seattle, Wash. 354 Belmont Street, Portland, Ore.
222 Continental Oil Building, Denver, Colo. 421 Kearns Building, Salt Lake City, Utah

Swing into action behind this barrage of

ELECTRIC RANGE ADVERTISING!

THROUGHOUT 1933, the Pacific Coast Electrical Bureau will be telling *your* story—helping *you* to sell more electric ranges.

A series of powerful advertisements, each shooting straight and hard. Appearing in magazines going into the hands of *your own prospects*. Talking electric ranges to housewives . . . home builders . . . farmers . . . building contractors . . . architects. Every possible target!

Turn this advertising to your own full advantage. Feature electric ranges in your show windows. Canvass your territory from house-to-house. Tie in with local advertising of your own. Make yourself known as *the* electric range dealer in your locality. Reap your share of business from this present opportunity!

The Pacific Coast Electrical Bureau stands ready to serve you in any way it can. Communicate with it for advice on your individual problems. Through this Bureau, the experience and knowledge of the entire electrical industry are available to you—without charge.

PACIFIC COAST ELECTRICAL BUREAU

447 Sutter St., San Francisco 601 W. 5th St., Los Angeles 848 Roosevelt St., Fresno